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MAIN CONTENTS :

	PAGES		PAGES
Summary of Recent Abstracts. V. Leishmaniasis	551–555	Deficiency Diseases	604–607
Malaria	555–569	Sprue	607–608
Trypanosomiasis	570–572	Haematology	608–610
Fevers of the Typhus Group.	573–578	Dermatology and Fungus Diseases	610–611
Bartonellosis	578–579	Tropical Ophthalmology	611–618
Yellow Fever	579–581	Heat Stroke and Allied Conditions	618–620
Amoebiasis and Intestinal Protozoal Infections	581–586	Tropical Ulcer	620–621
Relapsing Fever and other Spirochaetoses	586–588	Miscellaneous Diseases	621–623
Yaws	588	General Protozoology	623–624
Leprosy	588–597	General Entomology	624–626
Helminthiasis	597–604	Laboratory Procedures	626–629
		Reports, Surveys and Miscellaneous Papers	629–630
		Book Review	630

For detailed Contents see pp. ii, iv, vi, viii and ix.

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BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

Vol. 44.] 1947. [No. 6.

SUMMARY OF RECENT ABSTRACTS.*

V. LEISHMANIASIS.

Visceral Leishmaniasis.

General: Epidemiology: Aetiology.

Shortt (p. 317) has given a condensed but comprehensive account of recent research on kala azar in India, in which so much light has been thrown on all sides of the question, and in which he himself has played a conspicuous part. This account should be read in the original.

Leitão (p. 1127) points out that canine leishmaniasis is prevalent in Portugal.

Adler (p. 721) notes that both human and canine kala azar have been found in Cyprus; the latter is not rare. Ten species of *Phlebotomus* have been found, but it is not known which is the vector.

Canaan (p. 319) states that although oriental sore is fairly widespread in Palestine, kala azar is comparatively unimportant, though it does occur. Kala azar has been found in dogs in some places.

Gevorkov (p. 720) finds a close correlation between the total number of dogs, the number of cases of canine kala azar, and the number of cases of human kala azar, in Samarkand. Most of the cases occur in children below the age of 5. The disease is kept under control by systematic measures adopted for early diagnosis and treatment.

Gast Galvis and Rengifo (p. 113) have found the first recorded case of kala azar, and several of cutaneous leishmaniasis, during a viscerotomy survey in Colombia.

Tchernomoretz (p. 539) has obtained pure cultures of leishmania forms of *L. infantum* and *L. donovani*, by planting flagellates in tissue cultures of spleen.

Senekjie and Lewis (p. 320) have found that when sera immune to *L. donovani*, *T. cruzi*, *L. tropica* and *L. brasiliensis* are added to cultures of the flagellates in rabbit blood agar, to a strength of 5 per cent., there is strong inhibition of the homologous organism. The action is not so marked with *L. tropica* and *L. brasiliensis*. The active factors are stable at 56°C. but not at 70°C., and complement is not necessary for the action.

Nájera (p. 721) thinks that *L. infantum* (but not *L. donovani*) may reproduce by schizogony, and describes the stages of this process. Commenting on this paper, Wenyon remarks that he finds the illustrations unconvincing.

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1946, v. 43. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

DA CUNHA (p. 113) undertook experiments to determine if the different species of *Leishmania* could be differentiated by serological agglutination methods, and concludes that they cannot. In comment, WENYON criticizes the author in the sense that he has not applied all the methods now used for the antigenic analysis of bacteria.

Transmission.

NÁJERA (p. 832) notes that larvae of *Phlebotomus* will feed in captivity on dried leaves of various trees, and thinks that this may to some extent explain their rural or suburban distribution in nature. He has devised a method of rearing them, in which he induces them to eat filter paper (cellulose) by impregnating it with nutritive fluids. He notes that sandflies are more common in Madrid than before the civil war, and attributes this to breeding in the bombed sites in the city, which are used as rubbish dumps or latrines. There is, therefore, a danger of introduction of kala azar.

NÁJERA (p. 1026) notes that *P. perniciosus* has been found in several provinces of Spain from which it had not previously been reported, and even up to an altitude of 1,500 metres.

AKALIN (p. 1026) has found *P. papatasi*, *P. perniciosus*, *P. minutus* and *P. sergenti* in Anatolia, Turkey.

Pathology.

CHATTERJEE (p. 722) has examined the femoral bone marrow in fatal acute cases of kala azar. The total number of cells was diminished, and nearly all the clasmatocytes present contained leishmania ; but the degenerative changes seen in the later stages were not present in these acute cases. For a full description of the changes, the original should be consulted. The author thinks that the progressive degeneration of the marrow, and the cellular changes, will explain the characteristic blood picture of kala azar.

GOODWIN (p. 318) describes a condition of gross oedema which develops in the late stages of *L. donovani* infection of hamsters, and which is apparently due to loss of protein through kidneys which are in a state of chronic nephritis ; the cause of this, presumably, is a leishmanial toxin. GELLHORN *et al.* (p. 722) confirm this finding, and show that, from the 46th day of infection, an increasing degree of amyloidosis develops, especially in the kidneys, and that increasing leakage of albumin therefore takes place. The albumin/globulin ratio of the plasma is greatly reduced, and the colloid osmotic pressure is lowered, with consequent leakage of fluid into the tissues.

Diagnosis.

ARMSTRONG (p. 425) describes two cases of kala azar in British soldiers, contracted in the Mediterranean, in which symptoms were very slight. The spleen was enlarged and leucopenia was found, but if this disease had not been borne in mind, the cases might easily have been missed. In both, marrow puncture was positive.

GHOSH *et al.* (p. 1125) have used a complement-fixation test for kala azar, in which the antigen is derived from a culture of *L. donovani*. This is highly specific, and is positive even in early cases when the usual serum tests are negative.

SEN GUPTA (p. 425) now titrates his WKK antigen (prepared from acid-fast organisms) in serum instead of in saline, and has confirmed the value of the test for the diagnosis of kala azar, provided that the patient is not suffering from leprosy or post kala azar dermal leishmaniasis. All except very early cases appear to give positive results.

Treatment.

GOODWIN (p. 319) had previously used the count of the number of leishmania per 100 spleen cell nuclei, in spleen smears, as a measure of the extent of infection of hamsters with *L. donovani*. He now explains the use of the same technique as a measure of the therapeutic activity of leishmanicidal drugs. For this estimation he compares a smear of spleen material removed at biopsy before treatment, with a smear taken a week after treatment. From data obtained with various doses, a dose response curve can be constructed. There is considerable variation between strains of leishmania, and strains of hamsters, and these should be standardized by using the same stocks, and the drug should be compared with a standard preparation such as solustibosan.

DUTTA *et al.* (p. 1029) show that the common Indian pigeon can satisfactorily be used in tests of toxicity of organic antimonials.

COLLIER and LOURIE (p. 1126) have tested the activity of 40 compounds on *L. donovani* cultivated in a special medium (which is described) at 34°C., the highest temperature at which satisfactory growth occurred. Antimonials of known activity *in vivo* showed little activity *in vitro*, but the technique was of some value in estimating the activity of the diamidines, and may be a useful screening procedure for that group.

BOSE *et al.* (p. 1028) have shown that the toxicity of urea stibamine (which varies considerably) is related to the amount of antimonious acid it contains; if this is low, toxicity is correspondingly low.

MORALES (p. 634) reports on the value of concentrated solustibosan, given by intramuscular injection, in the treatment of infant kala azar; this treatment has previously been used in Spain, with success.

DASTIDAR (p. 318) has used Stibatin (Glaxo) in kala azar; this contains 20 mgm. of pentavalent antimony per cc., and injections are made into muscle. The patients, however, could not be followed up adequately.

CHAKRAVARTY (p. 833) has followed up 53 cases of Indian kala azar treated with Stibatin (Glaxo); for details of dosage the original abstract should be consulted. In 6 months, 5 had relapsed. The drug is specific and its toxicity is low; it is therefore particularly useful in mass treatment campaigns. SEN GUPTA and CHAKRAVARTY (p. 834) have used this drug on 50 patients, in rather higher dosage than before, with clinical cure in 48. These patients are being followed up to determine the permanence of the results.

ADLER *et al.* (p. 114) have tested certain aromatic diamidines on cultures of *L. donovani* to see if there is any correlation between action *in vitro* and *in vivo*; no such correlation was found in the case of propamidine, pentamidine and stilbamidine.

FULTON and GOODWIN (p. 17) show that although the aromatic diamidines in the solid state may turn yellow on exposure to light, this does not affect their toxicity and therapeutic powers; if these yellow forms are in solution, however, exposure to light quickly renders them toxic.

FULTON and GOODWIN (p. 17) have devised a spectrographic method for estimating stilbamidine in biological fluids. They find that in mice it is rapidly absorbed and stored, or excreted since the concentration of the drug in the serum diminishes rapidly shortly after administration.

By estimating excretion of stilbamidine in the urine by fluorescence and by a glyoxal reaction, WIEN (p. 723) has shown that a large proportion of the drug is metabolized and excreted in non-fluorescent form. The kidneys, apparently, can eliminate only a limited amount of the compound each day.

OASTLER and FIDLER (p. 1029) have found lesions of the central nervous system of dogs treated with stilbamidine, which are probably due to vascular spasm or anoxia. The authors refer to the nervous disturbances which have

previously been described in man and animals treated with members of the diamidine series.

Sen Gupta (p. 722) has used phenamidine for kala azar, but finds that it is less useful than the best pentavalent antimonials or pentamidine. On the other hand, it is non-toxic, and may have a value when antimonials are contra-indicated, for instance, in cases complicated by pulmonary tuberculosis.

Horgan and Satti (p. 17) found no benefit from the use of penicillin in two cases of kala azar in the Sudan.

Sen Gupta and Chakravarty (p. 833) have successfully treated 6 cases of cancrum oris, complicating kala azar, with penicillin (systemic and local application) and antimonials, This is very satisfactory since, as a rule, without penicillin, the case mortality rate is 50 per cent.

Cutaneous Leishmaniasis : Oriental Sore.

Canaan (p. 319) shows that foci of oriental sore in Palestine have spread considerably since the war of 1914–18. There are now several endemic areas, round Jericho (the original area), Bethlehem, Jerusalem and Haifa.

Kojevnikov (p. 724) refers to the fact that in Ashkhabad, two forms of oriental sore are found, the dry (urban), and the moist (rural) forms. He produces good evidence that these two forms do not immunize against each other, though when one form occurs in a person who has previously had the other, the second sore is often of reduced severity. For prophylactic vaccination, therefore, the strain common to the area, or both strains, should be used.

By inoculating contaminated material from oriental sores into liquid or solid media containing penicillin, Mukerjee (p. 1030) has succeeded in obtaining pure cultures of the flagellates with ease.

Referring to the diagnosis of oriental sore in American soldiers who return from abroad, Packchanian (p. 723) advises that cultures should be made in the water of condensation of blood agar medium, since there is no danger of confusing flagellates with any other organisms, and other methods of diagnosis are difficult to the inexperienced.

Kamel (p. 1126) reports 3 cases of leishmaniasis of the eyelid, a site rarely affected.

Dostrovsky and Sagher (p. 1030) report a case of relapse of oriental sore, in a girl in Aleppo, aged 10, in whom 110 lesions were present, indicating a complete breakdown of the usual cutaneous immunity.

Sagher (p. 1028) describes a case of oriental sore in which no sign of healing occurred, and in which there was no reaction to intradermal injection of vaccine, until the sore had been exposed to grenz-rays. After this, healing began, and the vaccine test became positive. The author discusses the possible reasons for these changes.

Berberian (p. 18) reports that local injections of a 10 per cent. solution of atebrin did not exercise any favourable effect on oriental sore ; intravenous neostibosan, on the other hand, was useful, and subcutaneous injections of a killed vaccine of *L. tropica*, by stimulating ulceration, favoured rapid healing.

On the other hand, Méchin (p. 1127) achieved rapid cure by injecting quinacrine (atebrin) into oriental sores, in 4 cases in Algeria.

Halawany and Jalili (p. 540) found that local applications of penicillin had no effect on oriental sore, except on secondary infection.

Filatov (p. 724) has used what he terms " tissue therapy " for the treatment of various conditions, including oriental sore, with apparent success. One method is to graft on to the patient skin from a cadaver, which has been kept under refrigeration for a week. This process is said to stimulate the healing process.

Ansari (p. 1127) has inoculated 120 persons in Teheran with cultures of *L. tropica*, to protect them against natural infection. Most oriental sores in nature occur in children aged 10; protective inoculations should therefore be given before this age.

Dostrovsky (p. 320) has produced oriental sores, without any incubation period, by injecting 2–16 million flagellates into the skin of volunteers. These are large doses.

Muco-Cutaneous Leishmaniasis (American).

Iriarte (p. 1128) describes muco-cutaneous leishmaniasis as it is seen in Venezuela, with special reference to involvement of the nose, mouth and pharynx. Treatment with intravenous tartar emetic is moderately successful.

Pessôa and Barretto (pp. 1127, 1128) discuss the distribution of leishmania in S. American leishmaniasis; most of them are found in histiocytes, but they may occur in polynuclear leucocytes and fibroblasts. Sometimes the parasites are found extracellularly, between cells which have been separated by inflammatory oedema. Parasites are plentiful in the acute stages, but rare in the chronic; they may be found in lymphatic glands near the cutaneous lesions.

da Cunha (p. 209) has infected rhesus monkeys with *L. brasiliensis*, by inoculation into the superciliary arches or the nose. In some cases the nasal mucosa became affected, not, as sometimes happens, by direct extension, but by some other, undetermined, channel.

Pessôa and Barretto (p. 1030) show that recovery from S. American cutaneous leishmaniasis is usually attended by very solid immunity. They produce evidence which indicates that vaccination with killed flagellates confers a considerable degree of resistance, and they argue that vaccination may be an important prophylactic measure.

Campos (p. 834) has accelerated the result of the Montenegro cutaneous test, and has eliminated doubtful reactions, by cupping the area after injection of the leishmanial antigen.

Cerruti (p. 1129) finds that the Montenegro test is positive in S. American leishmaniasis, even if it is done on skin previously scarred by smallpox vaccination or other cause. *Charles Wilcocks.*

MALARIA.

de Crisenoy, J. Fièvres paludéennes et fièvre jaune à Cayenne (Guyane Française) en 1855–1856. [**Malarial Fevers and Yellow Fever in Cayenne in 1855–1856.**] *Rev. Paludisme et Méd. Trop.* 1947, Feb. 15, v. 5, No. 33, 46–8.

Mackerras, I. M. & Aberdeen, J. E. C. **A Malaria Survey at Wewak, New Guinea.** *Med. J. Australia.* 1946, Nov. 30, v. 2, No. 22, 763–71, 10 graphs & 1 fig. [20 refs.]

By means of techniques which were specially adapted to the rapid collection of information under war conditions, the authors made a detailed malaria survey at Wewak in New Guinea. The survey was intended to provide a background for other researches into strains of parasites and some more general field investigations, but is here reported as a general contribution to the epidemiology of malaria.

The climate of the area is equatorial, the mean annual rainfall is 87 inches, the transmission of malaria is probably perennial, and the vector

anopheline is *Anopheles punctulatus farauti* which constituted 98 per cent. of the total anopheline catch. The sporozoite rate was 2 per cent. and the oöcyst rate 3·5 per cent. of 200 *A. punctulatus farauti* dissected. From a study of the total numbers of these anophelines present, their relationship to the number of men and their sporozoite rates, the authors deduce that each human individual receives three or four fresh infections weekly.

The changes in the spleen and parasite rates with age are shown in Table II.

Spleen and Parasite Rates.

Observation	73[1] Hwain Infants	100 Hwain Children	100 Hwain Women	100 Hwain Men	200 Japanese, Wewak	524 Australians,[2] Wewak
Spleen rate ...	93%	92%	60%	55%	8%	10%
Average enlargement of spleen	2·2	1·5	1·2	1·0	0·5	—
Parasite rate ...	92%	59%	33%	29%	47%	5%
Infection rate ...	130%	71%	35%	32%	57%	5%
Gametocyte rate	49%	16%	5%	6%	22%	2·5%

[1]The spleen rate is based on 61 infants, the remainder being " screamers " who could not be palpated.

[2]Figures from Major I.C. Macdonald and Major J. I. Tonge.

Very large spleens are common in infants and reduction in size usually happens before childhood. There was a normal reduction in parasite counts with age, but the authors note particularly that in each age-group there was a tendency for a bimodal distribution of the parasite counts ; and they deduce that those below about 40 per cubic millimetre represent infections suppressed by natural immunity and those over this figure represent overt infections. The reduction in the parasite and spleen rates with increasing age was abnormally rapid as compared with findings elsewhere. The authors assume from evidence locally obtained that the minimum number of gametocytes per cubic millimetre necessary to infect anophelines is 40 for *Plasmodium falciparum* and 10 for *P. vivax*. If these standards are correct the sole native source of infection of anophelines with *P. falciparum* was infants ; native children and adults having too few gametocytes. The Japanese and also other Australians were, however, a potential source of infection and probably the main ones. *G. Macdonald.*

SABROSKY, C. W. **Correction on the Nomenclature of Human Plasmodium.** [Correspondence]. *Science*, 1946, Oct. 25, 401–2.

Returning to the subject of the correct nomenclature of the malarial parasites the writer points out that a careful reading of the 1885 paper by MARCHIAFAVA and CELLI, which is accepted as founding the genus *Plasmodium*, has shown him that not only is this correct, but that the name *Plasmodium malariae* is definitely and correctly presented as the name for the parasite of malaria which was the cause of an epidemic in the Pontine Marshes. The description of M. and C. shows that they were dealing mainly with the malignant tertian parasite, as crescents and other distinguishing features are repeatedly referred to, but there is little doubt that the form now known as *P. vivax* also entered the picture. The writer considers that as the name *P. malariae* was given by M. and C. to a mixture of two species, considerable confusion can be avoided by restricting the name *malariae* to the benign tertian form. This name would then be a homonym, the correct name for the benign tertian parasite being the next valid one, viz. *vivax* Grassi and Feletti, 1890 (=*malariae* M. & C., 1885, *nec malariae* Laveran, 1881). If this be accepted, *vivax* would become the genotype of *Plasmodium* M. and C., it would be unnecessary to suspend the Rules of

Nomenclature in order to designate a type for *Plasmodium*, while the status of *Laverania* Feletti and Grassi as a possible name for the malignant parasite if it should be segregated would not be disturbed. *C. M. Wenyon.*

UNGUREANU, E. Nouvelles contributions à l'étude des races d'*A. maculipennis*. Caractères morphologiques des femelles. 1-ère Note. [**Morphological Characters of Females of** *A. maculipennis*.] *Arch. Roumaines Path. Expér. et Microbiol.* 1944, Jan.–Dec., v. 13, Nos. 3/4, 487–94, 16 figs. on 9 pls.

The characters described in this paper greatly assist in the differentiation of the adults of *Anopheles elutus* [*sacharovi*], *A. maculipennis atroparvus, A. maculipennis typicus, and A. maculipennis messeae* as found in Rumania. All except *A. elutus* have scales on the prothoracic lobes; the wing scales are broadly lanceolate in all except *A. maculipennis atroparvus*, in which they are narrow and sharply pointed; the pale spot at the wing tip is absent in *A. elutus*, present in the others, but rather inconspicuous in *A. maculipennis messeae*.

These differences were seen in captured and bred specimens and are nearly always constant; the degree of constancy among 100 bred specimens of each form is shown in a table; the paper is illustrated by 16 photographs.

H. S. Leeson.

VAN THIEL, P. H. & WEURMAN, C. Observations physiques concernant les causes de la penetration de l'*Anopheles maculipennis* var. *atroparvus* à jeun dans les locaux habités ou non par l'homme ou par le porc. [**Physical Observations on the Entry of Starving** *Anopheles maculipennis* **var.** *atroparvus* **into Occupied or Unoccupied Places.**] *Bull. Soc. Path. Exot.* 1946, v. 39, Nos. 7/8, 290–95.

The authors discuss the factors influencing the entry of *Anopheles maculipennis* var. *atroparvus* into occupied or unoccupied animal and human quarters. They deal with atmospheric conditions inside and outside baited and unbaited traps, inside large open air cages, basing their remarks on experiments performed in 1937 and 1939. Temperatures, relative humidity and saturation deficiencies were recorded and the behaviour of starving mosquitoes observed. The authors conclude that atmospheric conditions by themselves are not the main factors influencing the entry into the traps; but that the odour given off by pig, and to a less extent by man, when occupying these places plays a major part. *H. S. Leeson.*

MACHELLA, T. E., with the technical assistance of R. FINE & D. F. BURGOON. **The Relationship of Bromsulphalein Retention to the Fever of Natural** *P. falciparum* **Malaria.** *Amer. J. Med. Sci.* 1947, Jan., v. 213, No. 1, 81–6, 4 figs. [11 refs.]

The bromsulphalein test has been used by the authors to investigate liver function in 33 Chinese soldiers naturally infected with *P. falciparum*, and also in three normal persons in whom fever was produced by means of typhoid vaccine. Observations were made on the malarial patients in the febrile period prior to treatment with atebrin (mepacrine) or sontochin (SN 6911), and at intervals of 1 to 2 days thereafter until excretion of the dye became normal, which occurred in most of the patients within 8 days. Similar tests were also made during the relapse period. In normal persons who received typhoid vaccine, the tests were made before, during and after fever.

The antimalarials used were apparently without influence *per se* on dye retention. Bromsulphalein was given intravenously in doses of 5 mgm. per

kilo. of body weight in one arm and blood samples were withdrawn from the other arm 30 minutes later for analysis. It was found that retention of dye, amounting on average to 16·6 per cent. was most marked during fever, was proportional to its intensity, and was negligible in 2 to 3 days after the fever had subsided in response to therapy. No correlation existed between the degree of retention and the presence of enlarged spleen [liver not mentioned] or anaemia. A similar degree of dye-retention was noted during the period of fever in the vaccinated subjects. *J. D. Fulton.*

LURYE, A. **Spontaneous Rupture of the Spleen.** *Amer. Rev. Soviet Med.* 1947, Feb., v. 4, No. 3, 223–5.

An account of 3 cases, two of which were due to malaria.

FALCONE, G. **Ocular Complications in Malaria. A Case of Dendritic Ulcer.** *Indian Med. Gaz.* 1946, Dec., v. 81, No. 12, 530–31.

"Ocular complications are seen in malaria; the actual knowledge of the malaria parasite cycle and of the immunological phenomena in malaria are in favour of specific humoral changes: the ocular complications may be related to these changes, probably as allergic reactions.

"A case of dendritic keratitis, relapsing with malaria attacks, is reported and its aetiopathology is discussed."

DA COSTA, E. Tuberculose e paludismo. [**Tuberculosis and Malaria.**] *Bahia Medica.* 1945, Nov.–Dec., v. 16, Nos. 5/6, 7–13, 3 figs.

The associated existence of tuberculosis and malaria is generally regarded as of grave import. The author stresses the fact that a large number of patients diagnosed as suffering from malaria in Bahia are in reality tuberculous and not malarial. He divides patients with fever of a malarial type into three categories: (1) Patients with fever, shivering and sweating, diagnosed as malarial, without laboratory confirmation, treated as such and cured. (2) Those with similar symptoms but who do not respond to antimalaria treatment [parasites presumably are not found in the blood], whom the medical man continues to regard as refractory cases of malaria, till the man himself or some friend persuades him to have an X-ray examination and the true tuberculous nature of the condition is revealed. (3) Those in whose blood malaria parasites are seen, but whose symptoms continued in spite of specific treatment, who go rapidly downhill with a diagnosis of "malignant malaria" till haemoptysis reveals the existence of a concomitant tuberculosis.

The moral of all this is that patients suspected of, or even definitely found to be suffering from, malaria, who do not respond to specific antimalaria treatment, should be carefully examined for tuberculosis. [Another example of the old adage that "More mistakes are made from lack of examination than lack of knowledge."] *H. Harold Scott.*

WAHI, P. N. **Action of certain Antimalarial Drugs on Plasma Prothrombin Level in Normal and Malarial Subjects.** *Indian Physician.* 1947, Jan., v. 6, No. 1, 1–8, 2 charts. [15 refs.]

Experiments confirm the observations of PIRK and ENGELBERG, this *Bulletin*, 1945, v. 42, 964.

GUHA, P. C. & MUKHERJEE, S. P. **Synthesis of New Antimalarial Drugs related to Atebrin. Parts I and II.** *J. Indian Inst. Sci.* 1946, v. 28A, Pt. 4, 63–74.

Bazemore, J. M., Johnson, H. H., Swanson, E. R. & Hayman, J. M., Jr. **Relation of Quinacrine Hydrochloride to Lichenoid Dermatitis (Atypical Lichen Planus).** *Arch. Dermat. & Syph.* 1946, Sept., v. 54, No. 3, 308–24, 2 charts. [Refs. in footnotes.]

This report contains the results of investigations made at Moore General Hospital, Swannanoa, N.C., from September 1944. It commences with a discussion of the morphology of the eruption, wherein the authors state that sweating did not occur in the involved areas affected with lichenoid lesions: "in cases of extensive involvement there was generalized hypohidrosis, involving apparently normal skin." In all, 314 cases were observed; in a group of 259 of these, 82 per cent. had dark complexions. The average age of 288 patients was 32·7 years. Most of the patients were white men, but 12 were negroes.

The eruption usually started on the extremities, commonly as an erythema or a papule. Thirty-three patients were examined by gastroscopy and 35 by sigmoidoscopy; by this means, only one case showed a lesion which might have been lichenoid, and this was situated in the colon. Various remedies were tried; therapy with bismuth, mapharsen, vitamin A and "BAL" was not of benefit.

Studies were made to determine the incidence of cutaneous sensitivity to mepacrine and to observe the effect of administration of the drug when the patients' lesions were healing. In all, 198 patients were patch tested. The results were not significantly different from those obtained in a control group of 100 cases of schistosomiasis. Two definite types of reactions occurred when mepacrine (0·2 gm. daily) was administered to "susceptible persons". The first type developed within 10 days as an acute erythema with oedema, which sometimes progressed to a generalized exfoliative dermatitis: in this type the patch tests were usually positive. The other type of reaction was a localized or fixed eruption which resembled lichen planus and developed after the drug had been given for from 60 to 97 days.

For reasons which are discussed at some length, the authors believe that there is "strong evidence of an etiologic relationship of 'atypical lichen planus' to the prolonged ingestion of relatively large quantities" of mepacrine, but agree that the mechanism of the action of the drug is unknown.

R. M. B. MacKenna.

Rai, B. B. *Enicostema littorale* **Blume in Malaria.** *Indian Med. Gaz.* 1946, Dec., v. 81, No. 12, 506–8, 1 fig.

A trial with 32 cases: some success is claimed. The powder is derived from a common Indian plant, locally known as *chhota chiraita*.

Ciuca, M., Ballif, L., Chelarescu, M. & Cristescu, A. Contribution expérimentale à la thérapeutique contre le gamétocyte à l'aide de la plasmoquine. Recherches expérimentales sur la dévitalisation des gamétocytes de *P. vivax*. [**Gametocyte Therapy of** *P. vivax* **with Plasmoquine.**] *Arch. Roumaines Path. Expér. et Microbiol.* 1942, July–Dec., v. 12, Nos. 3/4, 411–18.

The activity of plasmoquine against the gametocytes of *P. falciparum* was early established and this property led to the use of the drug in malarial prophylaxis. The fact that gametocidal therapy with plasmoquine has not eradicated malaria even in feebly endemic areas is due to a number of factors including the variable action of this drug on gametocytes of different species of plasmodia. In the present investigation, the activity of plasmoquine has been tested against the gametocytes of *P. vivax*. For this purpose 20 general paralytics were infected experimentally, 11 of them with sporozoites and the remainder with

infected blood. From the 5th to the 14th day of illness, when exflagellating gametocytes were present in the blood of all the patients and no treatment had been given, plasmoquine was administered as follows :—

Group I. 15 patients received a single dose of 0·02 gm. plasmoquine.
,, II. 3 patients were given 5 doses of 0·02 gm. drug on successive days.
,, III. 2 patients received 2 doses of 0·02 gm. drug with an interval of 5 days between doses.

The number of gametocytes and exflagellating forms was noted before and after treatment. Batches of 20 to 40 *A. maculipennis* var. *atroparvus* were fed on the patients before drug was given, 4 hours after administration and then daily for a number of days. At appropriate times oöcyst counts were made and the presence or absence of sporozoites in the salivary glands of the mosquitoes noted. In group I, it was found that the blood of 74 per cent. of the patients was no longer infective for mosquitoes up to the 5th day although exflagellating forms were present, while the blood of the remaining 24 per cent. was still infective on the 5th day after drug. In group II, the gametocyes were devitalized after the second dose of drug and failed to exflagellate 3 to 5 days after treatment was started. The gametocytes in the blood of group III patients were more resistant and proved infective to mosquitoes 6 to 8 days after the last dose of drug. Comparison of these results with those previously obtained by the authors with *P. falciparum* [this *Bulletin*, 1937, v. 34, 156] shows clearly the greater resistance of gametocytes of *P. vivax* to plasmoquine.

[The present paper was written before the advent of Paludrine which, although not gametocidal in the usual sense, has been shown by Fairley and colleagues (this *Bulletin*, 1946, v. 43, 527) to prevent development of the gametocytes of benign and malignant tertian malaria in mosquitoes fed on the blood of patients a few hours after the drug had been taken. The effect on development in the mosquitoes persisted throughout the period of drug administration and for some time thereafter. As a true gametocide, Paludrine was inferior to plasmoquine.] *J. D. Fulton.*

Boyd, M. F. & Kitchen, S. F. **An Attempt at Active Immunization with *Plasmodium vivax* Killed in Vivo.** *Amer. J. Trop. Med.* 1946, Nov., v. 26, No. 6, 749–52, 2 charts.

An attempt was made to immunize two persons against *P. vivax* by inoculating them with infected blood while they were undergoing therapeutic courses of quinacrine hydrochloride (mepacrine), the view being that the injected parasites would be rapidly destroyed by the drug in the blood and that antigen would thus be liberated to function as an immunizing agent.

Each person received three courses of mepacrine at intervals of two months ; on the fourth day of each course he was given an intravenous injection of infected blood. In no case did parasites remain in the blood for longer than 24 hours. About 4 months after the last course, when mepacrine had been eliminated from the blood, each person was bitten by one or two infected *A. quadrimaculatus*. Parasites appeared in the blood in 14 and 9 days, while clinical signs of infection occurred 5 and 7 days later. Though infection occurred in both cases, the course was modified in several ways. Thus, there was a high pyrogenic level, a low maximum density in the parasitaemia and a sharp clinical attack. These departures from the normal course of events are similar to those which occur when persons who have experienced an attack of *P. vivax* malaria are re-inoculated with a heterologous strain. It would appear, therefore, that the two patients inoculated during administration of mepacrine did acquire an appreciable immunity to the homologous strain of *P. vivax*.

C. M. Wenyon.

CIUCA, M., BALLIF, L. & CHELARESCU, M. Contribution à l'étude de l'immunité dans l'infection paludéenne expérimentale. Observations recueillies sur 41 sujets immunisés. [**Immunity following Malaria Therapy.**] *Arch. Roumaines Path. Expér. et Microbiol.* 1943, Jan.–Dec., v. 13, Nos. 1/2, 45–122, 41 figs. [111 refs.]

In connexion with the malaria therapy of general paralysis in Bucharest, the authors have found it possible to follow 41 patients for periods varying from 4 to 14 years and to test their immunity to the species of parasite with which they were treated. After the treatment course, further injections of various strains of the same parasite were given to the patients with the object of rendering them hyperimmune. Following this hyper-immunization, no further injections of parasites were given for a number of years although monthly microscopical examinations of the blood were made ; while from time to time blood was taken and injected into new patients to test the presence or absence of parasites. Finally, at the end of the period of observation, inoculation of blood into a new patient was carried out, followed by re-inoculation of the patient under observation with one or other of the strains of parasite previously used for his hyperimmunization.

A detailed account of each of the 41 cases is given in the text. The observations show that the most marked and lasting immunity is produced by *P. malariae*, an immunity which exists after the complete disappearance of parasites from the body, so that there is in this case no question of premunition. In the case of *P. vivax*, in most cases immunity is associated with the persistence of parasites, so that premunition plays a more important rôle than in *P. malariae*. In three cases of *P. vivax* infection, however, there appeared to be a definite and lasting immunity in the complete absence of parasites from the body. With *P. falciparum*, the least immunity was obtained. This is to be explained by the fact that the primary inoculations require to be curtailed by treatment, while infections persist for a much shorter time than do those of the two other species. On this account, the antigens of *P. falciparum* are acting on the organism for a relatively short period. Nevertheless, after several years the infections produced by re-inoculation resolve themselves spontaneously without treatment, showing that some degree of immunity exists. *C. M. Wenyon.*

VAN RIEL, J. Les acquisitions récentes dans la lutte antimalarienne. [**Recent Advances in Anti-Malaria Measures.**] *Bruxelles-Méd.* 1947, Mar. 2, v. 27, No. 9, 443–60, 4 figs.

KENNEDY, J. S. **The Excitant and Repellent Effects on Mosquitos of Sub-Lethal Contacts with DDT.** *Bull. Entom. Res.* 1947, Mar., v. 37, Pt. 4, 593–607, 1 fig. [14 refs.]

Some two years ago when papers on DDT began to appear in print, it was said that the substance was not a repellent, and that an insect which exhibited symptoms of DDT poisoning never recovered and was doomed to die (Buxton 1945). The author shows that both these statements may be misleading.

The author's experiments are carefully and critically thought out. In one set, he uses a small box (very carefully shielded from external disturbance) : the box is of glass, with a back of paper which may or may not be impregnated with DDT. If the paper is impregnated, the dose in use is about 200 mgm. per sq. ft., *i.e.* heavy by field standards. If it is plain paper, the female *Aëdes*

aegypti rests on it for an average of 2·4 minutes: but if the paper is impregnated with DDT, the resting average is 0·7 minutes.

In a second series of experiments, essentially similar but including also *Anopheles maculipennis atroparvus*, it is again shown that the resting periods on the DDT paper are reduced to roughly a third of the periods on normal paper. There are, however, more acts of alighting on the DDT. The actual number of *Anopheles* settled on the paper was not much reduced by DDT, and the number of *Aëdes* was in fact increased (because the increased alightings more than compensated for the shorter periods of rest).

Other experiments are described, in which the author used a box with two experimental sides (treated and untreated). The results are not dissimilar, except that the DDT tended to make the insects restless, so that rest periods even on untreated surfaces were short.

In all these experiments of both types there were very few deaths after twenty-four hours even following exposure to DDT: the duration of all experiments was twelve minutes, long enough to cause measurable excitation, but not resulting in death.

The author then carried out critical work on the reactions to light of mosquitoes which had or had not been exposed to DDT for short periods. The insects were put in a small container, the walls lined with paper (treated and untreated). After two minutes, ports were opened with minimal disturbance and the insects could pass either into a dark or a dimly lit cage. After a further three minutes ports were closed and mosquitoes counted. It was found that with a plain container, approximately equal numbers of *Aëdes* chose darkness and dim light, but if the container was lined with DDT paper all *Aëdes*, except those remaining in the container, went to the light. In *Anopheles* the proportion which left the container was higher after exposure to DDT than not (*i.e.* the brief exposure excited them): of those which left the container, the proportion going to dim light rather than darkness was high, whether or not they had been exposed to DDT. The author points out that the reaction of mosquitoes to light is complex and imperfectly understood. But whatever the interpretation, such movements as he describes would result in mosquitoes leaving a dark sprayed house and escaping through a window. They might, however, owing to the excitation, have sampled the walls thoroughly, and perhaps remained a considerable total period on them. The author rightly concludes that his experiments raise doubts to what the effect of DDT in house spraying may be: they also show that the treated surface is "repellent" at least in one sense. But whether the exposure would be sufficient to cause death would depend on many circumstances.

P. A. Buxton.

FAY, R. W., SIMMONS, S. W. & CLAPP, J. M. **Extended Laboratory Investigations on the Toxicity of DDT Residues to Adults of** *Anopheles quadrimaculatus*. *Pub. Health Rep.* Wash. 1947, Jan. 31, v. 62, No. 5, 149–58, 8 figs.

An apparatus is described for exposing young adult mosquitoes for different periods to DDT-treated surfaces made up into cages 3×3×12 in. Different rates of deposit were tested at intervals from 0 to 68 weeks after application of the DDT. As a standard spray the following emulsion was used: DDT, 35 gm.; Triton X-100, 4 gm.; Xylene, to make 100 cc.; this concentrate was diluted so that 4 cc. of emulsion deposited the desired amount of DDT (50 to 300 mgm.) per square foot. Results:—

(1) *Age of deposit.*—The following are a few selected results from the pooled figures for 50 to 300 mgm. deposits.

	Percentage kill by different exposures.				
	35 min.	60 min.	90 min.	120 min.	180 min.
Fresh deposit ...	86	98	100	100	100
4 weeks old	84	88	92	100	100
20 ,, ...	28	49	68	85	93
40 ,, ...	—	54	59	69	90
60 ,, ...	—	46	62	79	89

(2) *Rate of deposit.*—Further investigations showed that residues below 100 mgm. per sq. ft. were unreliable for lasting effectiveness, while deposits of 300 and 400 mgm. were not sufficiently better than 200 mgm. per sq. ft. to be economically feasible.

(3) *Choice of solvent in the emulsion.*—Tests were made with the following solvents as vehicle for the DDT (*a*) Xylene (*b*) Kerosene (*c*) PD-544C (*d*) Solvesso No. 2 (*e*) Velsicol AR-50. From the results it appears that (*a*) and (*d*), which were the most volatile, lost most toxicity in the first twelve weeks but were subsequently stable. (*a*), (*b*) and (*c*) were moderately effective for nearly 60 weeks and definitely better than (*d*) and (*e*).

(4) *Sex and resistance.*—Tests with males and females of *A. quadrimaculatus* showed that the latter were consistently more resistant. *J. R. Busvine.*

Clapp, J. M., Fay, R. W. & Simmons, S. W. **The Comparative Residual Toxicity of DDT to *Anopheles quadrimaculatus* when applied on Different Surfaces.** *Pub. Health Rep.* Wash. 1947, Jan. 31, v. 62, No. 5, 158–70, 6 figs.

The apparatus described in the previous paper was used to compare the residual toxicity of DDT applications (from various emulsions) to mosquitoes. It was found that deposits on rough wood, fabric, well-dried paint and rubbing varnish were effective and persistent. Spray applications on linoleum, fresh paints, spa varnish or simulated adobe (dried mud) were decidedly less effective, presumably owing to adsorption or penetration of the DDT. The dried mud surface was particularly inert even with deposits up to 600 mgm. DDT per square foot.

The emulsions used did not damage plastic screen or fabrics, but if applied too heavily they caused some cloudiness of high gloss enamels and some staining of wall-paper. Where kerosene or Velsicol AR-50 were used as the DDT carriers there was less likelihood of a white bloom of crystals being visible on dark-gloss enamels.

Some DDT sprays were applied to whitewashed surfaces, the pigment being either lime or "spent" calcium carbide. The lime did not appear to have a deleterious effect on the DDT deposit; in both cases the incorporation of salt into the whitewash produced a more effective DDT deposit on the outer surface.

Grease or smoke deposits on surfaces previously treated with DDT, decrease the efficiency of the insecticidal residues. *J. R. Busvine.*

Tarzwell, C. M. & Fisk, F. W. **Observations on the Nighttime Resting and Biting Habits of Anopheline Mosquitoes in DDT-Treated and Untreated Buildings.** *Pub. Health Rep.* Wash. 1947, Jan. 17, v. 62, No. 3, 84–94, 2 figs.

The development of residual insecticides, the effect of which is dependent on insects resting for a relatively long period on the treated surface, has made a study of the normal resting habits of mosquitoes desirable. The authors studied

the night-time behaviour and resting habits of *A. quadrimaculatus* in rooms the walls and ceilings of which were marked like a map grid so that the position and movements of mosquitoes could be accurately charted. Observations were made by torchlight, first at hourly intervals and later at 15-minute intervals. Observations were made in normal rooms and in those treated with DDT, and some associated data on such subjects as biting frequency were also collected.

In untreated rooms, mosquitoes rested for considerable periods both before and after biting. The rest period varied from a few minutes to over 11 hours and was about the same in engorged and unengorged specimens; the average resting time for engorged females was 170 minutes, but the extreme dispersion round this is shown by the fact that the standard deviation was 124 minutes. The modal resting time was 1–2 hours (30 per cent.) while 12 per cent. rested for less than 1 hour.

In rooms treated with DDT the picture was quite changed; the resting period varied from a few to 90 minutes, the average for engorged females being 33 minutes with a standard deviation of 20. The modal time was less than half an hour (44 per cent.), while a further 36 per cent. rested from a half to one hour. The author assumes that the modal resting period is in fact less than 15 minutes. The percentage of engorged females resting on the wall rose from 14 per cent. to 31 per cent., which might indicate that some of the unengorged mosquitoes were sufficiently irritated by the DDT to leave before biting. Immediately after spraying there was considerable protection against biting.

In an untreated barn, the number of resting mosquitoes rose steadily throughout the night from 34 in the evening to 486 at 6.30 a.m. In treated barns there was no such increase; there was a small number (16) at 9 p.m. and this decreased steadily throughout the night until about 6.30 a.m., after which there was a rapid influx of mosquitoes coming in search of day-time resting places.

G. Macdonald.

STEPHENS, P. A. & PRATT, H. D. **Work with Residual DDT Spray in Puerto Rico. A Report of the First Year's Work.** *Science.* 1947, Jan. 10, 32–3.

The common carrier of malaria in Porto Rico is *Anopheles albimanus*, a wild mosquito which feeds on man during twilight or at night and seldom remains inside houses for more than a few hours. EARLE [this *Bulletin*, 1938, v. 35, 21] had previously shown that in small native villages little reduction occurred in the number of malaria cases until the *albimanus* population had been reduced to such a low level that animal-bait traps collected less than one per night. Application of DDT has not produced a reduction of this nature in *A. albimanus*, presumably as a result of its wild habits.

The parasite rate is here studied in an untreated village and in one to which DDT was applied. In the untreated village it followed the usual course, being 4·7 per cent. during the rainy season, sinking to 1·5 per cent. in the dry weather, and rising to 3·8 per cent. again in the following rains. On the other hand, in the treated village which was sprayed with DDT twice in a period of twelve months there was a progressive decline in the percentage of positive slides from 5·8 per cent. in the rainy season to 2·8 per cent. in the dry, and, most significant of all, to 0·91 per cent. during the following rains. The author therefore considers that DDT is an effective weapon against malaria, even in areas where the carrier is of the wild variety.

G. Macdonald.

IYENGAR, M. O. T. **Naturalistic Control of the Breeding of *Anopheles sundaicus* by means of *Eichhornia*-cover.** *J. Malaria Inst. of India.* 1946, June, v. 6, No. 3, 309–10.

In areas to the east and south-east of Calcutta it was observed that the breeding of *Anopheles sundaicus* was generally associated with floating algal

growth or submerged aquatic vegetation or both. It was also noticed that vegetation which formed a dense shade over the water surface inhibited the breeding of this anopheline. The most effective of these shade plants seemed to be *Eichhornia speciosa*, the water hyacinth. Ponds which were completely covered had no larvae and partially covered ponds had larvae only in the open patches.

Several ponds breeding *A. sundaicus* were therefore selected and planted with *Eichhornia* which, six weeks later, covered the whole surface. Subsequent examination showed that, though no larvicide had been used, larvae of *A. sundaicus* had disappeared. Later, three marshes (six to nine acres in extent) were similarly treated and were found to be entirely free of larvae during the period of observation, from June 1945 to February 1946, again without any larvicidal treatment.

The author suggests that shading by dense growths of *Eichhornia* may control the breeding of *A. sundaicus* by killing off the algae which form the food of the larvae. *H. S. Leeson.*

Westphal, E. A. & Horton, R. K. **Malaria Control Work in Chimbote, Peru.** *Bol. Oficina Sanitaria Panamericana.* 1946, Sept., v. 25, No. 9, 796–809, 5 figs.

The town of Chimbote is at present a small fishing village of about 4,000 population on the coast of Peru 250 miles north of Lima, but is expected to enlarge greatly because there are in the area one of the finest natural harbours on the West coast of South America, an abundance of coal and possibilities of hydro-electric power.

The area is practically rainless, but in the vicinity of the town there are several extensive fresh-water lagoons with a surface area of 218 acres which serve as admirable breeding grounds for *Anopheles pseudopunctipennis*, the local vector of malaria. The only other anopheline in the district, *A. punctimacula* is present in such small numbers as to be unimportant. The spleen rate and parasite rate of 472 children were 24·6 per cent. and 9·1 per cent. at the beginning of the time covered by this report.

During port construction work, temporary control of breeding was obtained by the use of tricalcium arsenite in the form of a water-kerosene emulsion similar to that used for the distribution of paris green. The technique was identical except that the dose of tricalcium arsenite was double that of paris green. As a result breeding was decreased, larvae were present in only 2 to 3 per cent. of their previous numbers, and adult catches decreased from 60 per cent. to 100 per cent. Prophylactic atabrine (mepacrine) was distributed on a voluntary basis. As a result of these various measures the spleen and parasite rates fell to 19·7 per cent. and 5·9 per cent.

The permanent control programme consisted in the drainage of the lagoons to the sea. There was a very small fall for this purpose and water had to be taken through a sand-bar and discharged below high tide level. This presented several technical difficulties but was successfully undertaken ; details of the drainage work are included in the paper. By this means the lagoon area has been reduced by 90 per cent. to 95 per cent. ; elimination of the remaining breeding areas is still in progress. *G. Macdonald.*

Wolfson, Fruma & Winter, Mary W. **Studies of *Plasmodium cynomolgi* in the Rhesus Monkey,** *Macaca mulatta*. *Amer. J. Hyg.* 1946, Sept., v. 44, No. 2, 273–300, 3 figs. [Numerous refs.]

The authors give an account of their study of *Plasmodium cynomolgi* infections in 65 rhesus monkeys. These were produced by intravenous inoculation of

varying doses of parasites in infected blood, subcutaneous or intravenous inoculation of sporozoites or by bites of infected mosquitoes. Sporozoites for inoculation were obtained from infected *Anopheles quadrimaculatus*, first shown to transmit the parasite by COGGESHALL [this *Bulletin*, 1942, v. 39, 400]. For blood inoculations, the most convenient dose was found to be 100 million parasites per kilogram of body weight. With this dose parasites are evident in thick films on the day following inoculations, while the peak of parasitaemia of 10 per cent. of infected erythrocytes is reached between the sixth and eighth days. Only a small proportion of monkeys inoculated show typical tertian periodicity uncomplicated by secondary broods of sporulating parasites. Tertian periodicity is more likely to occur if infections are produced by very small doses of parasites, if the inoculum is taken from donors showing a clear tertian periodicity or if the parasites to be inoculated are subjected to low temperature freezing.

Monkeys infected by sporozoite or blood inoculation may completely recover from their infection from three and a half months onwards. Reinoculation of recovered monkeys produces infections which differ from primary infections only in the shorter patent period. In view of the tendency to recovery, infections should be transmitted at least every six months in order to maintain a strain of this parasite. It has been shown, however, that parasites subjected to low temperature freezing are viable for nine months. The tendency for monkeys to recover completely from their infections, as does man after inoculation with *P. vivax*, shows that mammalian malarial parasites differ fundamentally from those of birds which apparently retain infections for life. The authors think that this difference may conceivably be associated with the presence of exoerythrocytic stages in the avian parasites and their possible absence from those of mammals. *C. M. Wenyon.*

WOLFSON, Fruma & CAKRTOVA, Marie. **Relationship between the Number of Parasites and Parasitized Erythrocytes in Avian and Simian Malaria.** *Amer. J. Hyg.* 1946, Sept., v. 44, No. 2, 301–11, 6 figs.

The investigation was carried out on *P. cathemerium*, *P. relictum* and *P. lophurae* infections in ducks and *P. cynomolgi* infections in rhesus monkeys. The infections produced by blood inoculations were studied from the point of view of the percentage of erythrocytes infected and the actual number of parasites per 100 erythrocytes. The values obtained are described by a theoretical curve based on a random distribution of parasites in the erythrocytes. This relationship may be affected by certain conditions. Thus, in the first two species long residence in the duck and exposure of the infected blood to low temperature freezing before the parasites were inoculated caused an alteration in the relationship ; long residence alone in the duck of *P. cathemerium* changed the relationship but did not do so in the case of *P. lophurae*. It is thought that the relationship revealed by this study may afford another test of parasite behaviour under varying conditions. *C. M. Wenyon.*

HOVANITZ, W. **Physiological Factors which influence the Infection of *Aedes aegypti* with *Plasmodium gallinaceum*.** *Amer. J. Hyg.* 1947, Jan., v. 45, No. 1, 67–81, 1 fig. [13 refs.]

It is a common experience in malaria research to find a great variation in the degree of infection of the vector mosquitoes. Some species are obviously more suited for the development of the sporocysts of a particular species of parasite, but within one vector species individual variations are common. Little work has been done to explain this question at all fully.

In the paper under consideration, some preliminary experiments are described. With *Aëdes aegypti* and the chicken malaria *Plasmodium gallinaceum*, there appears to be comparatively little individual variation among the mosquitoes, provided that the same amount of blood containing a constant number of malaria parasites is ingested on each occasion.

The title of the paper is a little misleading as no other physiological factors, except weight, were studied. There appears to be a relation between the number of eggs laid by a female mosquito and the number of plasmodium cysts which is hardly surprising as both of these conditions are related to the quantity of blood ingested. *Kenneth Mellanby.*

CEITHAML, J. & EVANS, E. A., Jr. **The Biochemistry of the Malaria Parasite. IV. The in vitro Effects of X-Rays upon** *Plasmodium gallinaceum*. *J. Infect. Dis.* 1946, May–June, v. 78, No. 3, 190–97, 5 figs. [Refs. in footnotes.]

The paper describes the results of an investigation into the effect of exposure to X-rays of red blood corpuscles of the fowl infected with *Plasmodium gallinaceum*. The investigation covered changes in infectivity, oxygen uptake, glucose consumption and lactate formation. The washed parasitized cells, separated from the whole blood by centrifugation and suspended in calcium-free phosphate saline solution of *p*H 7·4, were exposed to varying doses of X-rays in plastic Petri dishes 1·0 cm. deep and 6·5 cm. in diameter. Infectivity after irradiation was tested by the intravenous inoculation of chicks.

It was found that exposure to 30,000 r units for 16 minutes brought about complete loss of infectivity. The irradiated parasitized cells utilized more oxygen and glucose than did the controls, while they produced lactic acid which the controls did not. Exposure to 10,000 r units had no measurable influence on the oxygen or glucose consumption or lactic acid production, while after injection into chicks infected cells increased in numbers, though at a slower rate than in the controls. In only three of the 15 chicks did appreciable blood infections result, but blood from all of the 15 gave rise to heavy infections in sub-inoculated chicks. The fact that only three of the test birds developed heavy fatal infections shows that the injection of the irradiated parasites had conferred a sufficient immunity to suppress the infection in 12 of them, in spite of the presence of viable parasites. When the dose of X-rays was reduced to 1,000 r units, exposure had practically no effect on the parasites, apart from the fact that the chicks died at a slower rate than did the controls.

Injection of unexposed infected cells into the 14 chickens which had survived the injection of infected cells exposed to 30,000 r units led to their infection and the death of three in five days, whereas of the controls four out of five died in this period. Furthermore, the peaks of the infections were much lower than in the controls. Similarly, when the 12 birds which survived the injection of cells exposed to 10,000 r units were injected intravenously with sporozoites, none became infected though all of five controls did so. It is evident that exposure to high doses of X-rays reduces the infectivity of parasitized erythrocytes partially or entirely and that the injection of these exposed parasitized cells confers some degree of immunity. The general results of the investigations reported in this paper are in agreement with the findings of BENNISON and COATNEY [this *Bulletin*, 1945, v. 42, 623.] *C. M. Wenyon.*

ROSTORFER, H. H. & MCGEE, Helen R. **Some Factors which decrease Arterial Saturation in Bird Malaria-Ducks infected with** *P. lophurae*. *Proc. Soc. Exper. Biol. & Med.* 1946, June, v. 62, No. 2, 151–4, 3 figs.

The authors have found that during the course of malarial infection in the duck there develops an anaemia accompanied by a fall in *p*H of the blood, a

marked decrease in the CO_2 combining power and a decrease in pK. There is at the same time a shift of the oxygen dissociation curve to the right and a decrease in the saturation of the blood *in vitro*. This decrease bears a linear relationship to the pH and CO_2 combining power except during the 6th and 7th days of infection, during which the blood is flooded with young red cells to the extent of 60 to 80 per cent. of the total red cells present. The authors believe that these young red cells are responsible for the abnormal decrease in O_2 saturation with the decrease in CO_2 combining power which occurs at this time.

Tests were carried out on mixtures of red blood cells from infected ducks and normal plasma and on mixtures of normal red blood cells and plasma from infected ducks. These did not support the view that the malarial plasma contained some factor capable of inhibiting full oxygenation of the haemoglobin, as suggested by WONG (*Science*, 1945, Sept. 14, 278) for *P. vivax* infections in man. It would seem that the state of acidosis and the presence of numbers of young red cells during the terminal phases of *P. lophurae* infections are sufficient to account for the decreased arterial saturation *in vitro* of the blood of malaria infected ducks. When the effect of temperature is superimposed on acidosis, the combined effect is sufficient to reduce the percentage of oxygen saturation to 70. These results are in accord with the views previously expressed by RIGDON and ROSTORFER [in the press] that the cause of death is severe anaemic anoxia which reduces the oxygen capacity of the blood to 18 or 19 per cent. of the normal. *C. M. Wenyon.*

WOLFSON, Fruma. *Plasmodium elongatum* **in the Pekin Duck.** *Amer. J. Hyg.* 1946, Sept., v. 44, No. 2, 268–72, 1 fig.

A strain of *P. elongatum* has been subjected to 41 consecutive transfers by blood inoculation involving 150 ducks, in the hope that an increase in virulence would take place. The infection in the duck is characterized by two peaks of parasitaemia in the first and second weeks. Following the standard dose of parasites of 3 billion per kilogram of body weight, the peak of parasitaemia remains below 10 per cent. The rapid passage from duck to duck brings about no change in parasitaemia apart from a slight increase during the first ten passages. Nevertheless only 27 per cent. of the ducks survived for 16 days, while one-half died during the first ten days. Ducks infected with *P. elongatum* develop a severe anaemia, with an erythrocyte count of only 300,000 per cmm. This is accounted for by the fact that *P. elongatum* attacks and destroys immature erythrocytes and their precursors in the bone marrow, so that the peripheral blood only gives a partial picture of the degree of infection.

It is pointed out that four species of *Plasmodium* available for study in the duck form a series. At one end is *P. lophurae*, which infects by preference mature erythrocytes, produces the most severe parasitaemia and the least severe anaemia. At the other end is *P. elongatum* with low parasitaemia and severe anaemia. Occupying an intermediate position are *P. cathemerium* and *P. relictum*, which infect immature erythrocytes but not their precursors, giving rise to an intermediate degree of anaemia. Similar to *P. lophurae* as regards its effect on the duck is *P. circumflexum*. *C. M. Wenyon.*

DEARBORN, E. H. & MARSHALL, E. K., Jr. **The Susceptibility of Different Species of Avian Malarial Parasites to Drugs.** *Amer. J. Hyg.* 1947, Jan., v. 45, No. 1, 25–8. [15 refs.]

The authors have tested the susceptibility of 4 different species of avian plasmodia, in the duck host, to a number of drugs of widely different chemical

constitution. Earlier work on these lines by MANWELL [this *Bulletin*, 1931, v. 28, 600 ; 1932, v. 29, 710 ; 1934, v. 31, 428] and by KIKUTH [*Zent. f. Bakt.* I. Abt. Orig., 1931, v. 121, 401] who used quinine and pamaquin, showed that different species varied in their susceptibility to these two drugs. The present authors using the methods described by MARSHALL *et al.* [this *Bulletin*, 1943, v. 40, 223 ; 1946, v. 43, 826], infected white Pekin ducks weighing 100 to 150 gm. with *P. lophurae*, *P. cathemerium*, *P. relictum* and *P. circumflexum* with parasitized erythrocytes varying in number from 50 to 380×10^6 so that the peak of parasitemia occurred on the 3rd to the 6th day in the different infections. Treatment was carried out by the drug-diet method, beginning 18 hours before infection.

The authors used 14 different drugs, which included quinine, pamaquin, quinacrine (atebrin), chloroquine, sulphadiazine and others of the SN series. In order to compare the results obtained with the different species, the quinine equivalents (" the ratio of the minimal effective dose of quinine to the minimal effective dose of the drug under test ") obtained for *P. lophurae* infections, were used as standards. With the wide range of drug types employed, marked differences in susceptibility were noted for all four species. Such difference in the same host may have resulted from variation in absorption by the parasites, from interference with different metabolic reactions or it may have depended on different modes of action of the agents used. In selecting drugs for test in human malaria, the use of a single avian plasmodial species cannot therefore be considered satisfactory. By the use of suitable drugs the malarial species themselves may be differentiated. *J. D. Fulton.*

THOMPSON, P. E. **The Effects of Atabrine on the Saurian Malarial Parasite, *Plasmodium floridense*.** *J. Infect. Dis.* 1946, Nov.–Dec., v. 79, No. 3, 282–8, 3 figs.

A new species of malarial parasite *P. floridense* was recently described in *Sceloporus undulatus*, a lizard from Florida, by THOMPSON & HUFF [this *Bulletin*, 1944, v. 41, 827]. Previous studies by THOMPSON [this *Bulletin*, 1945, v. 42, 541 ; 1947, v. 44, 43] on the effects of quinine on saurian malaria parasites have been extended in an investigation of the suppressive effect and mode of action of atebrin in blood-induced infections of *P. floridense* in the lizard *Anolia carolinensis*. It was hoped that this cold-blooded vertebrate might be of value in chemotherapeutic research. The methods used were similar to those already described in the above papers. Infections were produced by injecting parasitized blood into the body cavity ; atebrin in 0·1 to 0·2 per cent. solutions was given in doses up to 100 mgm. per kilo. of weight by the same route. When the drug was administered during the rise of the infection its progress was inhibited, but the number of parasites in the blood decreased only slowly over a period of 2–3 weeks, and allowed continued observation to be made on their appearance in stained films. Damage to trophozoites and young schizonts was apparent 24 hours after drug treatment and gametocytes and mature asexual forms after 72 hours, the number of merozoites per segmenter also being reduced. Some parasites, however, appeared to escape damage. When the drug was given on the day of inoculation it did not prevent the appearance of parasites in the blood, although the peak reached was much lower than in controls. The suppressive action of atebrin in this infection appeared to be similar to that of quinine. *J. D. Fulton.*

TRYPANOSOMIASIS.

DE BORCHGRAVE, O. Action du " chinosol " (sunoxol) et d'autres produits pharmaceutiques sur " Trypanosoma gambiense " et sa parasitose chez le cobaye. [**The Action of " Chinosol " and other Compounds on *T. gambiense*, *in vitro* and in Guineapigs.**] *Rev. Belge Sci. Méd.* 1941, Nov., v. 13, No. 9, 356–65, 1 fig. [21 refs.]

The following compounds were examined for activity against an arsenic-resistant and a sensitive strain of *T. gambiense* :—

Quinoline derivatives	Acridine derivatives	Miscellaneous
" Chinosol " (or " Sunoxol ")	" Atebrine " (Bayer)	" Astreptine " (*i.e.* sulphanilamide)
" Plasmochine " (Bayer)	" Argoflavine " (Bayer)	" Nipagin M " (*i.e.* methyl ester of *p*-hydroxybenzoic acid)
Quinine hydrochloride		Carbolic acid

For *in vitro* tests, infected blood was obtained by cardiac puncture and mixed with 1/10 its volume of 5 per cent. sodium citrate solution, or with 1/5 its volume of " liquoid Roche " anticoagulant, in the presence of varying concentrations of the compound under investigation. After a few seconds, or after 1 to 5 minutes at room-temperature, the mixtures were then inoculated subcutaneously, in amounts of 1 cc., into guineapigs, which were subsequently examined for evidence of infection. When blood from guineapigs heavily infected with the arsenic-resistant strain was used, each of the compounds was found capable of sterilizing the trypanosome-containing mixture in a few seconds at concentrations of 1/500, or within 5 minutes at concentrations of 1/1,000.

In similar tests with the arsenic-sensitive strain, " chinosol " was compared with quinine hydrochloride, the time of exposure *in vitro* being 20 minutes. The former compound proved to be five times as active as the latter, the sterilizing concentration being 1/5,000 as compared with 1/1,000.

Motility is retained by trypanosomes apparently for a longer period than infectivity, during *in vitro* contact with " chinosol ". Thus, whilst infectivity was lost within 5 minutes on exposure to a concentration of 1/1,000, motility persisted, under the same conditions, for periods which varied, in different experiments, between 45 minutes and 7 hours.

The minimum lethal subcutaneous dose of " chinosol " for rats is about 1 gm. per kilo. body weight, and for guineapigs 0·1 gm. per kilo. Red blood cells of guineapigs or of man fail to lyse at concentrations of 1/1,000 [duration of contact not stated]. " Chinosol " is accordingly regarded as only slightly toxic, and is suggested as suitable for use in blood-transfusions, by the addition of 0·5 gm. to 500 cc. blood, where there is a possibility of the donor being a subject of trypanosomiasis, and where it is therefore necessary to take special precautions against transmitting infection.

As a therapeutic agent, however, " chinosol " exhibits little activity. A dose of 0·05 gm. per kilo. body-weight cleared parasites (of either strain) from the blood of infected guineapigs, but relapses occurred 3 to 8 days later.

E. M. Lourie.

Muniz, J. & de Freitas, G. Estudos sobre a imunidade humoral na " Doença de Chagas ". [**Humoral Immunity in Chagas's Disease.**] *Brasil-Medico.* 1946, Oct. 19 & 26, v. 60, Nos. 42/43, 337–41. [13 refs.]

The authors have found that for the preparation of *Trypanosoma cruzi* antigen, large quantities of the culture forms can be obtained by growth on a medium consisting of 2 per cent. nutritive agar containing 2 per cent. glucose, at a *p*H of 7·2, with the addition just before use of 10 per cent. defibrinated rabbit's blood. This is essentially Nöller's medium. From the culture forms removed from the surface of the blood agar in a 2 per cent. solution of glucose an antigen is prepared according to the technique of Davis [this *Bulletin*, 1943, v. 40, 890] in which the mass of disintegrated organisms is suspended in a saline solution of merthiolate, which ensures the retention of the antigenic properties for a considerable time. With this antigen complement fixation tests in acute and chronic cases of Chagas's disease and in experimental infections in rhesus monkeys have been carried out and correlated with agglutination and precipitin reactions. In four monkeys the complement fixation was positive on the 4th day of the prepatent period, which lasted from 8 to 10 days. On the 2nd day of the patent period the sera of the monkeys agglutinated in titres of 1/160 to 1/320. On the 10th day the titre had increased to 1/1,280 to 1/2,560. In one monkey which survived as a result of vaccine treatment, the serum showed a titre of 1/1,280 after 20 months. The precipitin test was positive from the 4th or 5th day of the patent period.

The sera from six acute human cases of 15 to 40 days' duration, strongly fixed complement in titres of 1/40 to 1/160. The agglutinating strength of the sera gave titres of 1/2,560 to 1/20,000, while the precipitin test was strongly positive in ten minutes. The agglutinating strength of the sera of four acute cases tested a number of times during periods varying from four to 20 months showed considerable variations. Whenever the agglutination occurred at a titre higher than 1/640 the precipitin test was positive. Of the sera of 211 chronic cases, 80 per cent. fixed complement, 85 per cent. gave agglutination in titres of 1/160 to 1/2,560, while 18 per cent. showed a positive precipitin reaction. The serum of a case of 30 years' standing showed agglutination at 1/640.

In these reactions and their variations the authors see reflected the changes which occur in the immunity during the course of *T. cruzi* infections. The immunity manifests itself when the reticuloendothelial system is first mobilized at the initial invasion of the tissues by the parasite. It increases when the blood is invaded by the trypanosome stages, which at first increase in number and then, after 30 or 40 days, begin to decline. It is then that the trypanosomes are largely phagocyted. They may be destroyed, but on the other hand they may become resistant to the destructive power of the phagocytes and begin to multiply within them as leishmania forms. The authors suggest that the formation of leishmania forms is not only directed to multiplication, but that it is also a means of protection, whereby the infection can be maintained when few or no trypanosomes can remain in the blood. In support of this view they have noted that if serum from a patient with high agglutination titre, mixed with the liquid from glucose blood agar, is employed as a culture medium, flagellate forms do not occur, but only masses of leishmania forms. When these leishmania forms are transferred to medium devoid of immune bodies, transformation into crithidia and trypanosomes takes place. In chronic phases of the disease, the decrease in the antibody content of the serum is due to the localization of parasites, as leishmania, at remote situations such as the muscle fibres of the heart, where they continue to multiply and infect new cells, but fail to stimulate any marked antibody formation. This balance between host and parasite may break down from various causes. *C. M. Wenyon.*

i. IKEJIANI, O. **Studies in Trypanosomiasis. I. The Plasma Proteins and Sedimentation Rates of Erythrocytes of Rats infected with Pathogenic Trypanosomes.** *J. Parasitology.* 1946, Aug., v. 32, No. 4, 369–73. [10 refs.]

ii. ——. **II. The Serum Potassium Levels of Rats during Infection with** *Trypanosoma lewisi, Trypanosoma brucei,* **and** *Trypanosoma equiperdum.* *Ibid.* 374–8, 2 figs.

iii. ——. **III. The Plasma, Whole Blood and Erythrocyte Potassium of Rats during the Course of Infection with** *Trypanosoma brucei* **and** *Trypanosoma equiperdum.* *Ibid.* 379–82. [12 refs.]

iv. ——. **IV. The Fragility of the Erythrocytes in Rats during the Course of Infection with** *Trypanosoma lewisi, Trypanosoma brucei* **and** *Trypanosoma equiperdum.* *Ibid.* 383–6.

In the first paper of this series, an account is given of an investigation of the proteins during the course of *T. brucei* and *T. equiperdum* infection in rats. It has shown that there is a loss of protein, chiefly albumin, as a result of lipoid nephrosis. Albumin can be detected in the urine. This brings about a fall in the serum albumin-globulin ratio. In the plasma, the concentration of the globulin fraction may actually exceed that of the albumin fraction. At the same time, there is acceleration of the sedimentation rate but this does not appear to be related to the protein changes. The responsible factor is in the red cells, for if the rapidly sedimenting red cells are suspended in the plasma of a normal animal the increased rate of sedimentation is maintained, whereas if red cells of a normal animal are suspended in the plasma of an infected animal there is no acceleration.

In the second paper it is shown that in *T. lewisi* and *T. equiperdum* infections in rats the animals reveal an increase in the erythrocytes followed by a steady reduction. In *T. brucei* infections, however, there is a fall in the erythrocyte count without any preliminary rise. In the case of the two pathogenic trypanosomes there is an increase in the serum potassium. There is a suggestion that this serum potassium may have come from the red blood corpuscles which are reduced in number. In *T. lewisi* infections there is no increase in serum potassium.

The third paper still further considers the serum potassium level in *T. brucei* and *T. equiperdum* infections. When the serum potassium level increases, this is accompanied by a reduction in the potassium level of the erythrocytes and of the whole blood and a decrease in the erythrocyte volume. It seems that the increased potassium of the serum is only partially accounted for by that lost from the erythrocytes. The remainder comes from body cells which, with the erythrocytes, suffer cellular damage. As the serum potassium increases only towards the end of the infection it does not seem to be a cause of death. More probably it is a result of the moribund state.

In the fourth paper, it is noted that there is an increased fragility of the erythrocytes tested against hypertonic salt solution in infections of rats with *T. brucei* and *T. equiperdum.* In *T. lewisi* there was no such increase. The increase in the case of the pathogenic trypanosomes may be due to the acidosis and anaemia, while the increased serum potassium may play a part.

C. M. Wenyon.

FEVERS OF THE TYPHUS GROUP.

SHEPARD, C. C. & TOPPING, N. H. **Preparation of Suspensions of Rickettsiae from Infected Yolk Sacs without the Use of Ether.** *J. Immunology.* 1947, Jan., v. 55, No. 1, 97–102.

The authors describe a method of preparing rickettsial suspensions from infected yolk sacs. The method is similar in principle to the one devised by FULTON and BEGG, who prepared suspensions of rickettsia from infected mouse and rat lungs. [See VAN DEN ENDE *et al.*, this *Bulletin*, 1947, v. 44, 472.]

A brief summary of the method, in the authors' own words is :—" Washing the rickettsiae by centrifugation, and absorption of much of the remaining yolk-sac material with Celite."

Suspensions of the rickettsiae of epidemic typhus, murine typhus, and Rocky Mountain spotted fever, were found to give very satisfactory agglutination with their homologous immune sera, but suspensions of Q-fever rickettsiae did not give sharp end-points when used in testing Q-fever immune sera.

Yolk-sac cultures of scrub-typhus rickettsiae were not found suitable for the preparation of suspensions ; the original growth was too scanty, and after preparation hardly any organisms could be detected.

Ether treatment of the prepared suspensions caused no liberation of soluble antigen such as occurred when untreated yolk-sac rickettsial suspensions were purified with ether, but when normal yolk-sac material was added to the prepared suspensions soluble antigen was liberated. *John W. D. Megaw.*

HAMPTON, S. F. **Anaphylactic Shock in Egg-Sensitive Individuals following Vaccination with Typhus Vaccine. A Study of the Antigenic Relationship of Egg and Chicken Meat Antigens and Typhus Vaccine.** *J. Lab. & Clin. Med.* 1947, Feb., v. 32, No. 2, 109–17.

A detailed investigation of two cases, following injections of a chick-embryo vaccine. It is suggested that persons about to receive vaccines prepared from chick-embryos should be questioned regarding egg-sensitivity, and, where this is probable, should be skin-tested with the vaccine in advance. This would apply equally to any other vaccines derived from egg-inoculation.

H. J. O'D. Burke-Gaffney.

WINKLE, S. Zur Typendifferenzierung in der Gattung Proteus Hauser. [**Type Differentiation of Strains of Proteus Organisms.**] *Zent. f. Bakt.* I. Abt. Orig. 1945, Jan. 20, v. 151, No. 8, 494–501.

An extensive study was made of 1,084 strains of *Proteus* organisms isolated from human beings in areas free from rickettsial infection in man.

Some of the strains were closely related to *Proteus X2*, *X19*, and *XL* in respect of their H antigens ; others were related to *Pr. XK* in respect of their O antigens.

By cross-agglutination and absorption tests, 12 serological types were differentiated, including four that behaved like *X2*, *X19*, *XU*, and *XK*.

Biochemical tests were carried out on 1,117 strains, and eight distinct types were found to occur. In most cases all the strains belonging to the same serological type gave the same biochemical reactions, but, exceptionally, a few of the *X2*, *X19*, and *XK* strains gave aberrant responses to the biochemical tests ; the author suggests that the abnormal reactions may have been due to repeated subculture of the strains over a long period.

John W. D. Megaw.

WINKLE, S. Über die Isolierung von zwei Stämmen Proteus X_{19}. [**Isolation of Two Strains of** *Proteus X19.*] *Zent. f. Bakt.* I. Abt. Orig. 1945, Jan. 20, v. 151, No. 8, 501–3.

Two strains of *Proteus X19* were isolated as a result of blood, stool and urine examinations of persons suffering from, or suspected of typhus ; one, an O form from the blood, and the other, an O+H form, from the urine.

H. J. O'D. Burke-Gaffney.

POLLARD, M., WILSON, D. J., LIVESAY, H. R. & WOODLAND, J. C. **The Oral Transmission of Murine Typhus in Humans.** *Texas Reports on Biol. & Med.* 1946, v. 4, No. 4, 446–51, 3 charts.

Each of six young and healthy volunteers swallowed 4·0 cc. of a saline suspension of untreated yolk-sac material of chick embryos infected with murine typhus. The suspension was given in gelatin capsules four hours after lunch and two hours before the next meal. The experiment was carried out in strictly controlled conditions.

Five of the volunteers remained normal, both clinically and serologically ; the sixth, after an incubation period of 11 days, had a typical attack of murine typhus in which the Weil-Felix (*OX19*) titre rose to 1–1,280, and the complement-fixation titre reached 1–2,560.

The authors state that " the dosage administered to the volunteers was probably very large in comparison with possible natural dosage by mouth." No evidence was found suggestive of the presence of any lesion of the gastro-intestinal tract.

The authors think that certain cases of the disease may possibly occur through swallowing food contaminated with infected flea faeces or rat urine.

[In the circumstances, most workers on the typhus fevers will probably regard the findings as evidence that natural infection by ingestion of infected material is likely to be a rare occurrence.] *John W. D. Megaw.*

LIU, W. T. **Isolation of Typhus Rickettsiae from Rat Mites,** *Liponyssus bacoti,* **in Peiping.** *Amer. J. Hyg.* 1947, Jan., v. 45, No. 1, 58–66, 4 figs. [21 refs.]

During an epidemic of typhus fever in a poorhouse in Peiping, 81 rats (*Rattus norvegicus*) were trapped ; 32 of these were Weil-Felix positive. Two of the latter group were investigated and both yielded strains of typhus rickettsiae. Among 189 smears prepared from *Xenopsylla cheopis* fleas from the captured rats 39·2 per cent. showed rickettsia-like bodies and among smears of 56 *Ceratophyllus anisus* fleas 16·1 per cent. showed similar bodies, but in smaller numbers.

Mites (*Liponyssus bacoti*) were found on 25 of 64 rats, and among smears of 100 of the mites examined, four showed rickettsia-like bodies. From each of two pools of the mites a strain of rickettsia was isolated ; one of these was transferred through three rats, then through five mice and 12 successive guineapigs. Only three of the guineapigs developed a scrotal reaction.

The author discusses the possibility that transmission of infection by the mite may occur from rat to rat and from rat to man, but he seems to favour the view that fleas are the chief, if not the only, vectors.

John W. D. Megaw.

LUDWIG, R. G. & NICHOLSON, H. P. **The Control of Rat Ectoparasites with DDT.** *Pub. Health Rep.* Wash. 1947, Jan. 17, v. 62, No. 3, 77–84, 8 figs. (6 on 3 pls.)

In this well-illustrated article the authors describe a carefully conducted field study of the control of fleas and other ectoparasites of rats by dusting the

burrows and runs of the rats with a 10 per cent. DDT powder. For the burrows, a foot-pump duster was used, and for the runs a hand-shaker duster was found suitable.

In 11 premises the infestation rate of *Xenopsylla cheopis*—the predominant rat flea—was reduced by 99·3 per cent. when tested five to eleven days later; this percentage of control fell off by about 5·0 per cent. *per mensem* during the following four months.

Rat lice and mites were also controlled, but less effectively; the numbers were not great enough to justify a percentage estimate of the reduction effected.

Care is advised to avoid contamination of food-stuffs with the dust.

John W. D. Megaw.

KALRA, S. L. **Report on the Distribution of Typhus Fever in the Army in India 1943–46.** *J. Indian Army Med. Corps.* 1947, Jan., v. 3, No. 1, 10–12, 2 graphs.

The title and substance of this paper may be misleading unless certain assumptions made by the author are taken into account: among these are (1) "high *OX2* or high *OX2* and low *OX19* agglutinins indicate tick typhus," and (2) "high *OX19* agglutinins indicate murine typhus in India."

The following table must be read in the light of these assumptions, which are not justified, as will be seen from the next abstract and from various articles dealing with the Weil-Felix responses in tick-borne typhus fevers. The headings of the table should be *OXK* type, *OX19* type, and *OX2* type instead of Scrub typhus, Murine typhus, and Tick typhus.

Typhus Cases in different parts of India.

Province	Scrub typhus	Murine typhus	Tick typhus
Bengal [and Assam]	237	40	5
United Provinces	17	30	13
Punjab	5	90	9
Central Province...	33	51	47
Bombay Presidency	15	49	18
Madras and Mysore	56	75	24
All India	363	335	116
All India less Bengal and Assam	126	295	111

In spite of the above reservation the findings can be regarded as constituting *prima facie* evidence that mite-borne, flea-borne and tick-borne typhus fevers are widely distributed in India, and that the mite-borne type is specially prevalent in Bengal, Assam and Madras.

From the charts showing the seasonal distribution of the three types it appears that the *OXK* type, which can be accepted as corresponding closely with scrub typhus, reached its peak in September and fell progressively almost to zero in March, and that the *OX2* type reached its peak in December and was least prevalent in May and June. The seasonal prevalence of the *OX19* type was irregular; there were more than 25 cases in April, May, June, October, November, December and January, and less than 25 in the other months.

References are made to the isolation of two strains of the rickettsia of tick typhus—one from a patient in Poona (Bombay Presidency) by Major Seaton, the other from a tick (*Haemaphysalis leachi* var. *indica*) in Imphal, by the author. These strains are said to be of low virulence, dying out after a few passages in guineapigs, but showing some antigenic relationship to *Rickettsia rickettsi*.

[See also the next abstract.] It is also stated that Kumaon strains of tick typhus "though not yet confirmed, are behaving similarly." These appear to be the first cases in which *R. rickettsi* has been isolated in India.

It is stated that "the present investigation in Kumaon Hills has revealed that scrub typhus is as common in these hills as in Assam or Burma," and that *R. orientalis* has been recovered from *Trombicula deliensis* mites, which are found in abundance at heights of 7,000 feet in the Kumaon Hills.

John W. D. Megaw.

SEATON, D. R. & STOKER, M. G. P. **A Serological Analysis of Typhus Cases in India by Weil-Felix, Rickettsial Agglutination and Complement-Fixation Tests.** *Ann. Trop. Med. & Parasit.* 1946, Dec., v. 40, Nos. 3/4, 347–57, 2 figs. [19 refs.]

In the study described in this paper the authors have applied modern serological methods to the differentiation of tick-borne from flea-borne typhus in India. Sera of all patients in military hospitals in whom the Weil-Felix reaction was of the *OX19* or *OX2* type were tested by a complement-fixation reaction on the lines described by Bengtson. The murine antigens were suspensions of lungs of mice or rats infected intranasally with murine typhus; the rickettsiae were separated from adventitious material by the method of FULTON and BEGG [see VAN DEN ENDE, *et al.*, this *Bulletin*, 1947, v. 44, 472]; the tick-typhus antigen was of the Rocky Mountain spotted fever (R.M.S.F.) type; it was supplied by Cox, and was of yolk-sac origin.

During the six months ending March 1st, 1946, 40 sera of the above serological types were tested; 18 of these reacted with murine antigen at titres ranging from 1–20 to 1–320 and were negative with R.M.S.F. antigen; 16 reacted with R.M.S.F. antigen at titres of 1–5 to 1–320 and were negative with murine antigen except for one serum in which the murine titre was 1–20 and the R.M.S.F. titre was 1–160; in five cases both reactions were negative, and in the remaining case the reaction with both antigens was positive at a titre of 1–5.

Control tests were carried out on 37 sera, of which 20 were from normal persons, 7 were from scrub-typhus patients, and 10 from patients suffering from various diseases; the reaction was negative in every case.

Of the 18 sera positive for murine typhus, 14 gave Weil-Felix reactions of the *X19* type, three of the *X2* type, and one reacted up to 1–1,600 with *X19* and *X2*. Of the 16 sera positive with R.M.S.F. antigen, 12 gave Weil-Felix reactions of the *X2* type and four of the *X19* type: on the strength of the complement-fixation reactions, these 16 sera were regarded as coming from patients suffering from infections of the same antigenic type as Rocky Mountain spotted fever, and so as furnishing further evidence that tick typhus occurs in India.

Rickettsia-agglutination tests were carried out with epidemic and murine rickettsiae on all the 40 sera; positive reactions occurred with both types of rickettsiae, but the only feature of the responses that was of differential-diagnostic significance was the occurrence in murine-typhus sera of higher-titre reactions against murine rickettsiae than against epidemic; the tick-typhus sera gave approximately equal titres against both types.

A reference is made to the strain of rickettsia isolated by Kalra [see the preceding abstract]; it is stated that the rat from which the infected tick was captured was infected with a typical strain of *Rickettsia tsutsugamushi*, whereas a guineapig at the fifth passage of the tick strain gave a 4-plus complement fixation with R.M.S.F. antigen at a titre of 1–10, and a negative reaction with epidemic, murine, and scrub-typhus antigens.

No mention is made of the tick-typhus rickettsia stated by Kalra to have been isolated by the senior author from a patient; Kalra's paper appears to have been written at a later date than the present article, which was received for publication in July, 1946.

Sera giving *XK*-type agglutination were not further investigated because their *Proteus*-agglutination response was regarded as diagnostic; most of them came from the Burma Front, but an outbreak occurred in a training establishment in a jungle area in Mysore, and there were isolated cases in the Punjab, Kashmir and elsewhere. *John W. D. Megaw.*

HENDERSON-BEGG, A. & FULTON, F. **The Standardisation of a Scrub Typhus Vaccine.** *J. Path. & Bact.* 1946, July, v. 58, No. 3, 381–9, 3 coloured figs. on 1 pl.

To meet the special needs incident to the large-scale production of cotton-rat-lung typhus vaccine the authors have devised a special method of standardizing the vaccine. The rickettsiae seen in impression smears of the infected lungs are counted after staining by the polychrome-methylene-blue method, already described by HENDERSON-BEGG and others [see this *Bulletin*, 1946, v. 43, 436].

The rickettsial content of the vaccine was estimated by a similar direct method of counting the organisms and also by measuring the amount of specific complement-fixation antigen contained in the vaccine.

The results obtained by these two methods were in substantial agreement with each other. Details of the new techniques involved are given in the paper.

John W. D. Megaw.

AUDY, J. R. **Scrub Typhus as a Study in Ecology.** *Nature.* 1947, Mar. 1, 295–6.

Investigations in Assam connected with the epidemiology of scrub typhus (tsutsugamushi disease) showed that different areas presented very different risks of infection to troops occupying them. These differences were correlated with the presence or absence of the mite vector of the disease, *Trombicula deliensis* Walch. The distribution of this mite and of various other species was studied and also the manner in which they parasitized the rodents in the same areas. Mites were found to form useful "ecological labels", for their presence on rats could be used to indicate the territory in which the rodents had been travelling. Frequently the rats seemed to be restricted to very small areas of ground. Not only could mites be used to indicate the movements of the rats, but the trapping of rats could give complementary information as to the presence of mites in the soil and the potential danger from scrub typhus. It is suggested that many other species of parasite may serve equally well as ecological labels and aid the study of rodent movements.

Kenneth Mellanby.

WEIL, A. & HAYMAKER, W. **The Distribution of the Pathologic Lesions of the Central Nervous System in Scrub Typhus (Tsutsugamushi Disease).** *J. Neuropath. & Exper. Neurol.* 1946, Oct., v. 5, No. 4, 271–84, 15 figs.

The authors made gross and microscopic studies of the entire central nervous system in 21 cases of scrub typhus. In 15 cases in which the duration of the illness was known, it had varied from 8 to 31 days, with an average of 14.

The tissues were fixed in 10 per cent. formalin, embedded in paraffin, and stained with haematoxylin and eosin (for special studies, cresyl violet and silver stains were used).

Whilst the intensity of the lesions found varied considerably, their distribution was fairly constant. The principal gross changes were engorgement of the vessels of the leptomeninges and cerebrum, and cloudiness of the leptomeninges, especially in the upper convex surface.

Histologically, the leptomeninges and perivascular spaces, and at times the choroid plexuses, showed reactions varying from mild oedema to marked cellular infiltration, consisting mostly of histiocytes but with many lymphocytes and some plasma cells. The exudate was most marked in the periventricular region, basal ganglia and amygdalo-hippocampal complex.

Focal inflammatory "nodules" were relatively few, and when present were found mostly in the grey matter of the cerebral cortex, though they did occur in the white matter and in the periventricular region. The paper is well illustrated by 12 microphotographs and three sets of clear diagrams.

H. J. O'D. Burke-Gaffney.

BARTONELLOSIS.

HODGSON, C. H. **The Treatment of Carrion's Disease with Large Transfusions.** *Amer. J. Trop. Med.* 1947, Jan., v. 27, No. 1, 69–75, 2 figs.

Most text-books on tropical medicine make no reference to the treatment of Oroya fever or Verruga peruana by blood transfusion. STITT (1942, 6th edition, p. 1012) denies that transfusion of normal blood has any favourable influence. But, as the present author states, "small or infrequent transfusions have been used heretofore, but never in sufficient quantity to attempt to replace the amount of blood being destroyed."

The two cases here described occurred in men aged 50 and 43 respectively and the symptoms in both were typical. The corpuscle destruction was rapid—from 4,300,000 to 1,370,000 per cmm. in a couple of days in the former, and to 1,800,000 "shortly after admission" in the latter; the haemoglobin was reduced to 32 and 30 per cent. respectively.

The first patient received 3,410 cc. of citrated blood in six slow drip transfusions in a fortnight. Two intervals, one of 6 days and one of 4 days, intervened because the patient's family was "persuaded by their friends that this was not the proper treatment," but they gave way and allowed them to be resumed when the symptoms became worse. One of the donors had had the disease 10 years before.

The second patient received a total of 8,150 cc. in 15 transfusions in 32 days (average about 550 cc. each time). None of the donors in this case had had the disease. Improvement was rapid, but after an interval of 6 days, the Hb was falling again and Bartonella reappeared, although the general condition remained good. Five more transfusions were given, after which recovery was uneventful.

In the first patient the eruption stage appeared 3½ months after the onset of fever, in the second nearly a year after.

The transfusions were in all cases by the slow drip, indirect, citrate method, 60–80 drops a minute, or some 2–4 hours for each transfusion. The amount of blood to be given must be gauged by the patient's reaction and the laboratory examinations; generally speaking, some 500–700 cc. daily are required during the more serious stage of the illness and there may be difficulty in obtaining so large a quantity.

The use of penicillin has been reported upon favourably, but is probably most useful in the secondary infections, pneumonia for example, which may be fatal

complications in Carrion's disease. The author makes the sound comment: "Naturally, one cannot say what would have been the outcome if these two patients had not been treated in this manner. They are not presented as a representative series. I can merely state that they were both seriously ill, both had severe anemia, both were definitely improved by transfusions and both recovered." [A most interesting paper. We must not, of course, deduce too much from a record of only two cases, but the results attained and the rational basis on which the treatment rests, call for further trial.]

H. Harold Scott.

YELLOW FEVER.

FINDLAY, G. M. **The Internal Combustion Engine and the Spread of Disease.** *Brit. Med. J.* 1946, Dec. 28, 979–82, 1 map. [15 refs.]

Increased traffic by road, rail and particularly by air provides opportunities for the spread of disease. The author fears that the present organization for the prevention of spread of disease by air traffic is inadequate, and that it should be replaced by another, more efficient one, before the post-war flood of air travel rises to its height.

Many diseases can be spread by aircraft; the two which are especially feared are yellow fever and malaria, but other possibly important ones are dengue, poliomyelitis, the insect-transmitted forms of encephalitis, trypanosomiasis and acute respiratory infections.

Many aircraft must touch endemic yellow fever zones, and it has been proven that mosquitoes can readily survive journeys of over 9,000 miles in which heights of 10,000 to 12,000 feet were reached. It is also possible that *Anopheles gambiae* might again be spread from its African home by air, and produce disastrous epidemics elsewhere as it did in Brazil in 1938. Prevention of spread of disease or disease-carriers involves the sanitary control of (*a*) airfields, (*b*) aircraft, and (*c*) air passengers, crew and ground-staff. These measures require elaborate staff and organization, which may often be satisfactory, but on the other hand may be inadequately supervised, despite the requirements of the International Sanitary Conventions for Aerial Navigation.

Although passengers may have been inoculated against yellow fever, they may not have been protected against it, as a result of faulty technique in the preparation, carriage, dilution or administration of the vaccine. Certificates of inoculation are insufficiently standardized, may be signed by any medical officer, and have even been known to have been forged. Many similar loopholes exist in the present arrangements; to close them the author suggests that an international organization, with staff and funds of its own, should be formed under the W.H.O., in close association with P.I.C.A.O. (the Provisional International Civil Aviation Organization). Its functions should be (*a*) to take sanitary control of all airfields which might be involved in the spread of disease from endemic to non-endemic areas, (*b*) to control the disinsectization of aircraft, (*c*) to control the storage, testing, and injection of yellow fever vaccine, and (*d*) to control the issue of yellow fever inoculation certificates.

Acceptance of such an organization would involve more than periodic meetings; it would necessitate the abrogation of authority over certain airfields, the staff of which would be directly responsible to an international organization.

G. Macdonald.

Roca Garcia, M. & Bates, M. Metodos usados en Colombia para el estudio del virus de la fiebre amarilla. [**Study of the Yellow Fever Virus as carried out in Colombia.**] *Rev. Facul. de Med.* Bogota. 1946, Aug., v. 15, No. 2, 89–122, 14 figs. [32 refs.] English summary.

This account of investigations of the virus of yellow fever shows that the methods used in Colombia are the same as those which have been proved to be most serviceable elsewhere. The virus and its transmission are discussed; animal inoculation, titration, the maintenance of infected laboratory animals and insects and preservation of the virus are described in detail; the article is, therefore, a useful survey of the subject for those wishing to get a general grasp of the virus and the methods of its study, but, for readers of this *Bulletin* it contains nothing new. *H. Harold Scott.*

Koprowski, Hilary. **Occurrence of Nonspecific Virus-Neutralizing Properties in Sera of some Neotropic Mammals.** *J. Immunology.* 1946, Dec., v. 54, No. 4, 387–94. [25 refs.]

The mouse protection or neutralization test has been used extensively to determine the presence of immune antibodies for the yellow fever virus in both man and animals. The test has been shown to be very dependable when applied to human sera; and with rare exceptions it is indicative of previous infection with the virus, either by natural means or as the result of injection of vaccine. This also applies to monkeys and other related primates. On the other hand, a number of species of animals, including cows, goats, sheep, dogs, etc., have been accused of being sources of false-positive reactions. In a recent immunity survey on forest animals in Brazil, a high percentage of positive reactions was encountered among certain species of rodents and marsupials, some of which had been captured in areas where yellow fever was not believed to be present.

Further investigations revealed that many of these sera would also neutralize Japanese B encephalitis, St. Louis encephalitis and West Nile virus, which, as far as is known, do not occur in Brazil. In general, similar results were obtained with all three viruses. Some of the sera of marsupials were also tested against western equine encephalomyelitis and influenza viruses with negative results.

This non-specific virucidal property was found to be transitory. Injection of neurotropic yellow fever virus resulted in a specific response to the virus. In several instances the anti-viral action against other viruses disappeared following the inoculation of yellow fever virus.

Three hours heating at 56°C. failed to inactivate the non-specific neutralizing activity of sera. *F. O. MacCallum.*

Laigret, Jean. Résultats de la vaccination contre la fièvre jaune après douze années de pratique. [**Results of Vaccination against Yellow Fever after Twelve Years' Experience.**] *Bull. Acad. Méd.* 1947, v. 131, Nos. 1/2, 13–17.

In this brief review, Laigret draws attention to the benefits of vaccination against yellow fever in the epidemic and endemic areas. He considers that the disease is no longer a serious problem from the public health aspect, and consequently economically, in the French territories in Africa.

The mouse-brain vaccine of Tunis and Dakar is said to produce little reaction, and only rarely a serious reaction. Laigret, however, does not support the simultaneous small pox-yellow fever intradermal vaccination as recommended by the French West African workers. He believes that the neurotropic properties of both vaccinia and yellow fever viruses may be enhanced if inoculated simultaneously and recommends a two-week interval between their injection.

Laigret remarks on the jaundice following the use of the old serum-containing 17D chick embryo vaccine prepared in the Americas and England. He believes this jaundice may be due to the strain of yellow fever virus used and not to an icterogenic agent in the serum as suggested by others.

[It is unfortunate that the author has not seen the papers of OLIPHANT *et al.*, (*Bulletin of Hygiene*, 1944, v. 19, 13) and MACCALLUM and BAUER (*ibid.*, 583) and many others as far back as 1944, which clearly demonstrated that the jaundice was due to an icterogenic agent in the human serum used and not to the yellow fever virus.] *F. O. MacCallum.*

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS.

HARRIS, A. H. & DOWN, H. A. **Studies of the Dissemination of Cysts and Ova of Human Intestinal Parasites by Flies in various Localities on Guam.** *Amer. J. Trop. Med.* 1946, Nov., v. 26, No. 6, 789–800, 2 figs.

An examination of the dejecta of flies caught on the island of Guam in the Pacific has shown, as heretofore, that these insects may be carriers of cysts of protozoa and eggs of helminths. Cysts of all the common intestinal protozoa (as well as *Trichomonas*) and eggs of hookworms, *Trichuris* and *Ascaris* were recovered, particularly from the large *Chrysomyia megacephala* which has been shown to breed in human faeces. In one locality a collection of flies was found to yield no cysts or eggs, the result, it appeared, of the local latrine being burned out daily with gasoline. In general it seemed that the smaller predominating flies were able to pass through their intestines only the smaller cysts of the protozoa. It was demonstrated that cysts of *E. histolytica* were deposited on a kitchen table by flies, while hookworm ova from which larvae subsequently hatched and developed were similarly conveyed to portions of food on the ground. The paper gives details of the traps used for catching the flies, the methods of investigation and the species of fly involved. *C. M. Wenyon.*

GUREVITCH, J. & DELIGHTISH, J. **Survival Time of** *Entamoeba histolytica* **in Feces.** *Harefuah.* Jerusalem. 1947, Feb. 16, v. 32, No. 4. [In Hebrew 59–60. English summary 60.]

For many years, the authors, working in Jerusalem, have observed that trophozoites of *E. histolytica* in stools will survive up to 8 hours at room temperature. They therefore studied survival times under different conditions.

Stools from 16 patients, containing motile amoebae, were each divided into three parts, placed under the three different conditions shown below, and examined microscopically every three hours until no living forms could be found.

The survival times were as follows :—

(1) Incubator, at 37°C. ; two to four hours.

(2) Room temperature, 25–30°C. ; five to eight hours.

(3) Refrigerator, 6–8°C. ; throughout the day ; after 24 hours, a few weakly motile amoebae were found in two cases, and non-motile forms in five ; the remaining nine specimens were negative.

While the immediate examination of a fresh specimen provides the best chance of diagnosis, this is not always practicable : the authors suggest that where transport to the laboratory is inevitable, results of examination are reliable if it is undertaken within 5 to 8 hours, including the time of transport. There is no advantage in keeping specimens at 37°C., but where immediate examination cannot be made, the stool may be kept in the refrigerator.

H. J. O'D. Burke-Gaffney.

PICK, F. Sur un nouveau milieu de culture de l'amibe dysentérique comportant la présence de l'insuline. [**Insulin Medium for Culture of** *E. histolytica*.] *Bull. Soc. Path. Exot.* 1946, v. 39, Nos. 9/10, 345–7.

As a culture medium for *E. histolytica* the author advocates the use of a base consisting of a watery agar devoid of nutritive value covered by Ringer-horse-serum. Each tube contains 2 cc. of the Ringer serum to which is added two loops of rich starch, one loop of chalk and four units of insulin. In this medium amoebae were able to survive 33 days. The authors have noted that under the influence of the insulin the grains of starch run together into clumps, while the bacteria, which grow abundantly, have a tendency to agglutinate and are thus rendered harmless to the amoebae. *C. M. Wenyon.*

SNYDER, T. L. & MELENEY, H. E. **Migration of** *Endamoeba histolytica* **on Solid Media.** *J. Parasitology.* 1946, Aug., v. 32, No. 4, 354–8. [10 refs.]

The possibility of cultivating *E. histolytica* on the surface of a solid medium not submerged, as is usual, under a liquid has been demonstrated by the authors. The solid medium employed was a horse-serum agar containing yeast autolysate, proteose peptone, cholesterol and Ringer's solution. After the slants had been standing overnight, all liquid of condensation was removed and one drop of culture of *E. histolytica* was introduced at the butt end of the tube. Anaerobic conditions were obtained in two ways. The mouth of each tube was closed by a rubber cork moistened with glycerin and bearing a tube through which evacuation by pump to 110 mm. of mercury was carried out; alternatively, oxygen was absorbed and carbon dioxide provided by introducing into each tube a cotton plug moistened with a mixture of 0·4 cc. of 20 per cent. pyrogallol and 0·7 cc. of 20 per cent. sodium carbonate solution. It seemed probable that the bacteria growing in the tube consumed any remaining oxygen. That anaerobic conditions existed was shown by the rapid reduction of methylene blue incorporated in the medium. Incubation was carried out at 37°C., the tubes being in the vertical position. The surface of the medium was examined through the wall of the tube with 16 and 8 mm. objectives. In 24 hours, the amoebae could be seen to be spreading over the surface of the medium 4 to 12 mm. in advance of the edge of the visible bacterial growth. It seemed probable that the bacteria actually extended beyond the visible edge of growth. Subcultures from the surface of the medium were successfully carried out, but it was not possible to obtain bacteria-free cultures in this way. There were indications that marked reduction of oxygen tension and elevation of carbon dioxide tension are essential for the growth and migration of the amoebae on a free surface. In some cases the whole surface was covered with a layer of amoebae in three days. At other times the growth was less profuse.

C. M. Wenyon.

BALAMUTH, W. & HOWARD, Betty. **Biological Studies on** *Endamoeba histolytica*. **I. The Growth Cycle of Populations in a Mixed Bacterial Flora.** *Amer. J. Trop. Med.* 1946, Nov., v. 26, No. 6, 771–82, 8 figs. [19 refs.]

The tracing of the growth of *E. histolytica* and the accompanying bacteria in various culture media has shown that both follow the classical bacterial pattern. A lag phase in the growth of *E. histolytica* suggests that the bacteria, in some way, prepare the medium and render it suitable for the growth of the amoebae. In fact when amoebae are first inoculated to a medium they experience a decline in numbers followed by a burst of reproductive activity. It was possible to demonstrate that rice-starch has a specific growth-promoting influence on the amoebae in the late stages of cultivation when the bacterial growth has begun

to decline. If bacteria are allowed to grow in the medium for some time before amoebae are inoculated, the lag phase is shortened. This appears to be due to the production by the bacteria of a growth-promoting factor which certain experiments show to be heat-stable. *C. M. Wenyon.*

Becker, E. R., Burks, C. & Kaleita, E. **Cultivation of *Endamoeba histolytica* in Artificial Media from Cysts in Drinking Water subjected to Chlorination.** *Amer. J. Trop. Med.* 1946, Nov., v. 26, No. 6, 783–8.

Cysts of *E. histolytica* from 3 cases of natural infection were added to 1,000 cc. of drinking water to which had been added calcium hypochlorite to give 2 parts per million of residual chlorine 10 minutes after the addition of the cyst suspension. The *p*H of the water was adjusted to 7, while the total nitrogen varied from 0·12 to 0·40 p.p.m. After exposure, the residual chlorine was neutralized with sodium thiosulphate. The cysts were then washed and inoculated to culture medium from which one or two subcultures were made.

The period of exposure of the cysts to chlorine varied from 10 to 60 minutes, while in some experiments the concentration of residual chlorine was increased to 5, 8 or 10 parts per million. When it was found that viable cysts were easily recovered after exposure to 2 parts per million of residual chlorine for 10 minutes, as proved by growth of amoebae in the primary culture or in the subcultures, longer exposures to the higher concentrations were tested. Even in these cases, viable cysts were recovered after exposures of 30 and 60 minutes. It is considered that chlorination of drinking water as practised for purposes of sterilization cannot be relied upon to destroy all cysts of *E. histolytica*.

C. M. Wenyon.

Do Prado, F. C. & Figliolini, F. Formas clínicas da amebíase. Estudo baseado em 500 observações. [**Clinical Forms of Amoebiasis.**] *Hospital.* Rio de Janeiro. 1946, Nov., v. 30, No. 5, 769–78. English summary.

A discussion based on 500 cases.

Reddy, D. G. & Rangam, C. M. **Amoebic Granuloma (Amoeboma) of the Large Intestine.** *Indian Med. Gaz.* 1946, Nov., v. 81, No. 11, 463–6, 9 figs. on 2 pls.

This paper consists of a review of six cases admitted to the General Hospital, Madras, with signs of intestinal obstruction, in 1940.

In the first, a freely movable lump was felt in the umbilical region. Skiagrams taken after a barium enema showed filling defects in the caecum; an irreducible large-sized ileocaecal intussusception mass was resected, measuring 5 inches in length. The intussusceptum was gangrenous and in the muscular layer clusters of amoebae were demonstrated.

In the second case, a tender mass, 4 by 1½ inches, was palpable in the right iliac fossa, not adherent to the anterior or posterior abdominal walls. During operation an intussusception was found in the region of the caecum. The mesenteric lymph glands were enlarged. The terminal portion of the ileum, caecum, and the right half of the transverse colon were resected. Smears made from the necrotic, oval mass in the caecum revealed active *E. histolytica*.

In the third case, a painful lump was present in the umbilical region. During operation, an irreducible ileocaecal intussusception was found necessitating resection of the last foot of the ileum, ascending and right third of the transverse colon with side-to-side anastomosis. On microscopic section amoebae were demonstrated.

The fourth patient complained of colic and melaena. Here an oval firm tumour mass, freely movable, was palpable in the right lumbar and umbilical regions.

Operation revealed a reducible caeco-colic intussusception below the under-surface of the liver, the apex being formed by an indurated depressed ulcer, necessitating a hemicolectomy with side-to-side anastomosis. *E. histolytica* in the active stage was demonstrated in the faeces, and on section of the tumour these parasites were numerous in the submucous layer.

In the fifth case, examination revealed rectal polyposis with perianal ulceration and a tender mass in the right iliac fossa. At operation there was found a partially reducible ileocaecal intussusception, which was resected. The apex of the intussusceptum was covered by a raised gangrenous area. Section revealed a combination of amoebic and suppurative infection.

The sixth patient complained of acute pain in the right iliac fossa and a tender mass was palpable above the appendicular area. At operation an easily reducible ileocaecal intussusception was seen. Hemicolectomy was performed. The appearance of the lesions in the gut were characteristic of amoebic ulceration and smears were teeming with active *E. histolytica* ; these organisms were also demonstrated in sections.

As a result of this experience the authors think that the granulomatous lesion does not by itself complete occlusion which results from the intussusception and oedema. The acute intussusception is initiated by irregular peristalsis.

Therefore, in tropical practice, a tumour mass in the course of the large intestine chiefly in the caecal region, should suggest amoebiasis and the diagnosis should be established by means of rectal swabs.

In sub-occlusion, medical treatment should suffice, but where complete occlusion has taken place resection of the gut becomes necessary, but if this is inadvisable, owing to the poor condition of the patient, a lateral anastomosis between segments of the bowel, proximal and distal to the intussusception, may have to be considered ; but it is essential that immediately scrapings should be made from the bowel surface to establish the correct diagnosis by the demonstration of *E. histolytica.*

Gut resection should always be followed by a full course of anti-amoebic treatment. If there is dehydration and low blood pressure amoebicidal drugs, less toxic than emetine, should be employed.

The exact explanation of the pathogenesis of an amoeboma is unsatisfactory and possible secondary bacterial infection plays a part ; though every amoebic lesion in the bowel is exposed to this risk, yet in a very small percentage of cases is this type of granuloma produced. *P. Manson-Bahr.*

Bonne, C. Over amoebiasis van de appendix. [**Amoebiasis of the Appendix.**] *Med. Maandblad.* Batavia. 1947, Jan., No. 6, 97–101, 2 figs.

In this clinical lecture a case of amoebiasis of the appendix in a prisoners' camp is described ; it was diagnosed as acute appendicitis. Operation was performed under primitive conditions, to find an appendix, non-gangrenous, without peritonitis but with inflammation of the tip. After removal, it was slit open and the turbid mucopurulent content examined microscopically after addition of a little 2 per cent. eosin. This examination revealed typical erythrocyte-containing *Entamoeba histolytica* ; search of the mucosa showed two other small areas of ulceration. The lecture discusses whether it was wrong to have operated. No amoebae, not even minuta or cyst forms, had been found in the faeces. Amoebiasis of the appendix apart from the colon is unlikely, but true appendicitis and amoebiasis may occur together. The lesson given is that, in the tropics, a surgeon removing an appendix should open it up before placing it in fixative, and sending it to a pathologist. If he adopts the simple technique here applied to the contents,

or scraping from the mucosa, he may discover amoebae and be able to start emetine therapy much sooner than if he had to wait for the pathologist's report.
W. F. Harvey.

Laha, P. N. **Amoebic Hepatitis and Associated Pericarditis.** *Indian Med. Gaz.* 1946, Dec., v. 81, No. 12, 528–9.

Report of a case. The pericarditis responded to emetine.

Bond, V. P., Bostick, W., Hansen, E. L. & Anderson, H. H. **Pathologic Study of Natural Amebic Infection in Macaques.** *Amer. J. Trop. Med.* 1946, Sept., v. 26, No. 5, 625–9, 2 figs. [11 refs.]

The authors have made a careful study of the intestines of five rhesus monkeys which were found by stool examination to be infected with *E. histolytica*. Both free amoebae and cysts were seen in the stools, 75 per cent. of which were positive. Other amoebae—*E. coli*, *E. nana*, *I. bütschlii*—were also present. As regards *E. histolytica*, these fell into two groups. There was a small race in which the amoebae and the uni- and quadri-nucleate cysts were about 5μ in diameter and a larger race in which the amoebae were 13–17μ in diameter, the precystic amoebae 6–10μ and the cysts 6–14μ. In the case of *E. coli* the amoebae varied from 8–22μ, the binucleate cysts from 9–14μ and the octonucleate from 12–18μ. At autopsy immediately after death abnormalities were limited to the large intestine. There was generalized congestion and, in a few areas in four of the monkeys, scattered pin-point mucosal haemorrhages. No gross evidence of ulceration was found. Microscopically there was a patchy low-grade chronic inflammatory reaction of the mucosa. This was characterized by oedema, increased numbers of leucocytes and plasma cells with varying numbers of macrophages often exhibiting phagocytosis. Interstitial haemorrhages were occasionally seen and rarely a shallow ulcer in the mucosa. More frequently cystic solitary glands of Lieberkühn dilated to 3 or 4 times the normal were encountered. These contained serous material, cellular débris and scattered polymorphonuclear leucocytes.

Amoebae were not found near the shallow ulcers nor near the inflamed solitary glands, except in one case where a single amoeba was seen. Other amoebae lay in the gland crypts, while some had invaded the tissues of the mucosa. Usually the tissue reaction round the invading amoebae was minimal. The invasiveness of the amoebae was evidently of a low order, as the monkeys gave no clinical evidence of their infection. The condition was that of the cyst-passer in the carrier phase of the disease. The authors consider that naturally infected monkeys are suitable for the study of amoebicidal drugs.
C. M. Wenyon.

Basnuevo, J. G. & Sotolongo, F. Giardiasis y aralen (Cloroquina) (SN-7618)–(W-7618)–(7-cloro-4-(4 dietilamino-1-metilbutilamino) quínolina difosfato). [**Giardiasis treated with Aralen.**] *Rev. Med. Trop. y Parasit.* Habana. 1946, July–Sept., v. 12, No. 3, 71–2. English summary (6 lines).

A report of 2 cures.

Soubigou, X., Autheman & Guennec. Note sur trois coccidies rencontrées à Toulon. [**Three Coccidia from Toulon.**] *Bull. Soc. Path. Exot.* 1946, v. 39, Nos. 9/10, 348–50.

Writing from Toulon the authors report three cases of *Isospora belli* (*I. hominis*) infection in men in the army and navy. They were unable to follow the development of the oöcysts to maturity but claim nevertheless that, when rabbits were

fed with it, one animal commenced to pass identical oöcysts seven days later and continued to do so for 22 days, during which it suffered from diarrhoea and loss in weight. *C. M. Wenyon.*

MALDONADO, J. F. "Isospora hominis" Fantham, 1917, en Puerto Rico. Comunicación del primer caso observado. [**The First Case of** *Isospora hominis* **Infection recorded in Porto Rico.**] *Rev. Med. Trop. y Parasit.* Habana. 1946, July–Sept., v. 12, No. 3, 74–5, 2 figs.

RELAPSING FEVER AND OTHER SPIROCHAETOSES.

DE NAVAILLE. **Relapsing Fever in Tunisia from 1939 to 1946.** *Bull. Office Internat. d'Hyg. Publique.* 1946, July–Aug.–Sept., v. 37, Nos. 7–8–9, 530–33. [French version 526–9.]

BOIRON, H. Contribution au diagnostic et au traitement de la fièvre récurrente à *Spirochaeta duttoni* dans l'agglomération de Dakar. [**Contribution to the Diagnosis and Treatment of Relapsing Fever due to** *Spirochaeta duttoni* **in the Built-Up Area of Dakar.**] *Ann. Inst. Pasteur.* 1947, Jan., v. 73, No. 1, 49–57. [19 refs.]

Tick fever is not uncommon at Dakar, for during the years 1942–1944, the author observed 205 cases including 70 Europeans and 135 natives. The disease is only exceptionally fatal but must be considered a serious infection in view of its painful symptoms and the frequency of sequelae.

The author discusses the various clinical manifestations and concludes that the most characteristic features are the sudden onset with shivering, fever up to 40°C. and violent frontal headache, defervescence on the third day but persistence of nausea and headache, sensitive liver, subicterus, and slight meningeal symptoms. In such cases the blood should be examined microscopically and also inoculated into mice. Subjective symptoms involving lucidity, paresis, disturbed reflexes, and ocular troubles are characteristic of spirochaetal meningo-encephalitis, the diagnosis of which can be confirmed by examination of the cerebrospinal fluid.

The most satisfactory method of treatment was found to be injections of sodium orsanine (270 Fourneau), one minimal dose of 0·1 to 0·2 gm., followed the next day by a full therapeutic dose of 0·02 gm. per kilo. body weight. This latter dose is repeated 5 days later in early cases of the disease, but nervous forms require two or three additional doses also at intervals of 5 days. The drug is prepared in 10 per cent. solution in distilled water, and the injection is given in the morning before any food.

Thirty-three cases were treated, the diagnoses of all of which were confirmed by animal inoculation. Twenty of these were in the early stages of the disease, and 18 were cured rapidly and showed no relapses. Eleven cases with meningeal symptoms gave 7 complete cures, 3 failures and 1 doubtful cure. In addition there were two other patients apparently cured whose history could not be followed. Among the 25 cured by orsanine, 7 have been followed for 2 months, 8 from 3 to 6 months, and 8 from 6 months to a year after treatment. Animal inoculations 10 days and then 1 month after the treatment were found to be the best test of cure and never failed in the cases examined. *E. Hindle.*

BENHAMOU, E., DESTAING, F., LEONARDON, H. & VARGUES, R. Les troubles cardiaques de la fièvre récurrente. [**Cardiac Complications of Relapsing Fever.**] *Algérie Méd.* 1946, Nov.–Dec., No. 6, 534–8.

BOURGAIN, M. Contribution à l'étude de la vitalité des spirochètes récurrents survivance de *Spirochaeta persica* Dschunkowsky 1912 en organes réfrigérés ou putréfiés de cobayes infectés expérimentalement. [**Contribution to the Study of the Vitality of Relapsing Fever Spirochaetes surviving in the Refrigerated or Putrefied Organs of Guineapigs Infected Experimentally with *S. persica* Dschunkowsky 1912.**] *Ann. Inst. Pasteur.* 1947, Jan., v. 73, No. 1, 84–6.

The author, with PIROT, previously recorded the survival of *Spirochaeta persica* in the organs of infected guineapigs [see this *Bulletin*, 1946, v. 43, 336]. The present note records the survival of the blood form for at least 19 days at +4°C., in the organs of infected guineapigs. Even at temperatures of 11° to 15°C., the spirochaetes survived for over 7 days ; at 37°C. they did not survive for 4 days in infected organs immersed in physiological saline.

E. Hindle.

BERNKOPF, H., OLITZKI, L. & STUCZYNSKI, L. A. **Studies on Bovine and Human Leptospirosis.** *J. Infect. Dis.* 1947, Jan.–Feb., v. 80, No. 1, 53–63, 4 figs. [10 refs.]

The occurrence of bovine leptospirosis in Palestine was first recorded by Freund, Trainin and Malkin in 1941 (*Palestine Vet. Bull.*, No. 8, 153) ; the present paper deals with the transmission of this disease to calves and the isolation of a leptospira from the infected animals.

This disease attacks cattle, goats and sheep and produces symptoms ranging from a slight rise in temperature accompanied by reduction in milk yield, up to severe cases in which there is pronounced jaundice and blood in the milk ; the animal may succumb with heart failure or convulsions. If the animal recovers, it may be months before it returns to normal health and milk production. In pregnant animals, abortion nearly always occurs, even in mild cases.

Blood, milk and urine of heavily jaundiced cows were injected into 7 to 10-day-old calves without any results, but infection was finally obtained by the injection of blood from a cow in the pre-icteric stage. The first calf infected in this way became jaundiced after 10 days and died the following day. Six consecutive passages were made in calves, in every case the blood being taken from the jugular vein about the 10th day of the infection. The 13 calves infected showed very different clinical features. Fatal jaundice appeared in 4 out of 8 animals in the first 3 passages ; 3 died non-jaundiced, 1 in the 3rd passage and 2 in later passages ; the other 6 recovered.

Leptospirae were demonstrated in Levaditi-stained sections of the liver and kidney of animals of the first 3 passages and the organisms were isolated in pure culture with the use of Noguchi's semi-solid medium. It is of interest that blood was drawn from an infected animal and inoculated into culture tubes on 11 successive days ; but only one tube inoculated on the 9th day became positive, and then only after an incubation of 7 days at 30°C. Under identical conditions the bovine strain did not grow as well as strains of *L. icterohaemorrhagiae*, isolated from a rat, and *L. canicola*, from a dog.

The serum of infected cows and calves, one month after recovery, agglutinated the bovine strain up to a titre of 1 : 5,000 ; but agglutinated the dog and rat strains only to 1 : 40 to 1 : 80. Serum from normal animals even at a low dilution, 1 : 20, did not agglutinate the organisms.

The bovine strain is said to infect human beings ; in Palestine, although no strain has yet been isolated from man, severe cases of jaundice with early kidney involvement are known to occur. The sera of 19 such persons were tested and all agglutinated the bovine strain in high dilutions ranging from 1 : 1,280 to 1 : 25,000. All these patients belonged to occupational groups

having close contact with cattle. A fatal case is described in which the patient presumably became infected from a slaughtered jaundiced cow which he was using for the preparation of poultry food. This patient became ill 8 days later and died on the 12th day of illness. In Levaditi-stained sections of the liver and kidneys, leptospirae were found by Drs. KASPER and REEF (personal communication), who also report two other positive pathological findings from similar cases in the neighbourhood of Tel Aviv. *E. Hindle.*

YAWS.

SIMPSON, T. **Yaws.** *Clin. Proc.* Cape Town. 1946, Dec., v. 5, No. 10, 413–37, 27 figs.

This article is based upon cases seen in Warri Province, Nigeria, and in the British Mandated territory of the Cameroons. Both have warm humid equatorial climates.

The descriptions are not very critical, but the following points might be noted. There is no mention of relapses and little direct reference to bone lesions in the secondary stage. With tertiary ulcers are included those developing from secondary skin lesions and in the scars of primary lesions. Gangosa is thought not to be due solely to yaws, although it responds well to anti-yaws treatment. Tertiary bone lesions include periostitis and osteititis with decalcification and later sclerosis. The relevant illustrations are of generalized and focal changes in the bones. "Bent Little Finger" (Dupuytren's contracture) in manual labourers occurred in yaws cases [but is not necessarily due to yaws]. Penicillin is regarded as the drug of the future in combating yaws, as it becomes more readily available. Good housing and cleanliness following treatment in new arrivals controlled yaws in supervised settlements, *e.g.*, plantations.

C. J. Hackett.

SEN GUPTA, A. C. **Observations on Yaws in Bastar State.** *Indian Med. Gaz.* 1946, Nov., v. 81, No. 11, 466–8, 1 map.

LEPROSY.

FAGET, G. H. **The Story of the National Leprosarium. The United States Marine Hospital, Carville, Louisiana.** *Pub. Health Rep.* Wash. 1946, Dec. 27, v. 61, No. 52, 1871–83, 4 figs. on 2 pls. [14 refs.]

This story has often been told so it may be briefly summarized here. The Gulf Coast States have always been most affected by leprosy. In the north central Minnesota area, on the other hand, leprosy among Norwegian immigrants nearly died out spontaneously. In 1894, the Louisiana State leprosy settlement was started near New Orleans and it was taken over by the Federal Government in 1920, when there were 90 patients in it. Large sums were devoted to its development and by 1923 accommodation had been provided for 425 patients. Special regulations were made for the safe transport of cases. It has been estimated that approximately 10 per cent. of the members of the family of a resident leprosy patient become infected, so infectivity is slight and is aggravated by concealment of cases. During 51 years, only one attendant at the Carville Leprosarium has developed leprosy. Everything is done to make the patients contented: each patient has a separate room. Until

recently, chalmoogra preparations were in general use, with limited results. The success of treatment by promin and diasone promises to be an important advance in treatment. A table shows that 171 patients have been discharged as " arrested " and no longer a menace to public health during the last ten years. The patients prefer to call their malady " Hansen's disease ". *L. Rogers.*

Floch, H. & de Lajudie, P. Sur la lèpre en Guyane Française. II. Incubation. Symptôme initial. Formes cliniques. Diagnostic. Evolution et pronostic. Syphilis et lèpre. Cause des décès. [**Leprosy in French Guiana.**] *Institut Pasteur de la Guyane et du Territoire de l'Inini. Publication No. 133.* 1946, Aug., 10 pp.

The authors record the following information regarding the incidence of leprosy in French Guiana. It is very difficult to estimate the incubation period of the disease, but they record two cases in infants in which it was as short, at nine and fifteen months respectively. In children, cases are often traced soon after the appearance of the first symptoms. In 1,354 such observations, the first observed signs of the disease were single lesions in 484, and two or more in the remainder. The most frequent sites were on face or neck, thighs, buttocks, legs, body or fore-arms in that order of frequency. Among the Creole population 74·4 per cent. were nerve, 18 per cent. lepromatous and 6·1 per cent. mixed cases ; but in Europeans and Arabs the respective proportions were 44 per cent., 27 per cent. and 28 per cent. Among the penal classes, lepromatous cases are most common with 85 per cent. of cases positive bacteriologically. In 20 cases classed as cured, 18 were neural ones. 358 cases in Creoles were under observation long enough to enable the evolution to be traced. Of 234 maculo-anaesthetic cases 95 improved, 90 were stationary and 49 became worse. In advanced neural cases, no case improved and 18 became worse. Of 68 lepromatous cases, 20 improved and 43 were worse ; of 22 mixed cases 7 improved and 13 became worse. Bacteriological examinations showed 7·7 per cent. of maculo-anaesthetic cases positive at first and 3·8 per cent. positive after treatment. In lepromatous cases all were positive at first and at the end of the period of observation, 51 per cent. remained positive. Deaths were due to cachexia in 161, tuberculosis in 18, dysentery or diarrhoea in 19, and to other causes in 40. *L. Rogers.*

Oteiza Setien, A., Ibarra Perez, R. & Gonzalez Prendes, M. A. Censo de lepra en Cuba. (Estado actual, Junio de 1946.) [**Leprosy in Cuba ; Census of June, 1946.**] Trabajo Publicado en el Boletin Official del P.S.L.E.C. 44 pp., 10 figs. 1946. La Habana, Cuba.

Two of the authors of this article have already published a paper on the sex incidence of leprosy in Cuba [this *Bulletin*, 1947, v. 44, 430] ; the present is much more comprehensive, dealing with the disease incidence all over the island. Forms are reproduced showing the details of information called for when a new case is notified, information regarding race, sex, age, etc., also of contacts. For the patient himself a very detailed form has to be returned, stating the type of disease, the sex, age, race, whether married or single, widowed or divorced, nationality, occupation, relations living with the patient, dependants, place and kind of residence, etc.

The returns have been collated under the following headings : i. Ambulatory patients ; ii. Hospital patients ; iii. Those allowed provisional discharge ; iv. Cohabitants ; v. Healthy children of lepers ; vi. Deaths. These are given separately for the Provinces of Pinar del Rio, Havana, Matanzas, Las Villas,

Camaguey, and Oriente, and the constituent figures for the different municipalities in each; here we can only summarize the findings:—

Ambulatory Patients.

Municipality	Males	Females	Total	Number per 10,000 (June 1946)
Pinar del Rio	43	23	66	1·63
Havana	295	200	495	3·97
Matanzas	85	48	133	3·68
Las Villas	231	146	377	3·91
Camaguey	158	120	278	5·62
Oriente	421	396	817	6·0
Total	1,233	933	2,166	4·5

Hospital Patients.

Municipality	Males	Females	Total
San Lazaro	243	82	325
San Luis de Jagua	197	114	311
Total	440	196	636

Deaths, 1936–46

	Males.	Females.	Total.
In hospitals	349	107	456
At home	52	27	79
Total	401	134	535

H. Harold Scott.

Ibarra Perez, R. & Gonzalez Prendes, M. A. Incidencia de la lepra y ocupaciones. [**Occupation and the Incidence of Leprosy.**] *Rev. Sifilografía, Leprología y Dermatología.* Marianao, Cuba. 1946, Oct., v. 3, No. 4, 159–65. [12 refs.]

The occupations of 2,840 leprosy patients in Cuba have been ascertained, but the subdivision is too detailed to allow much in the way of valid deduction to be drawn, for the occupations number 105 and in 36 of them there is only a single case and in 78 the number is less than ten. The greatest incidence, 723 (25·3 per cent.) was among women working at home; next come agricultural labourers, 430 (16·6 per cent.), retired or of "no occupation" 231 (8·3), day labourers 180 (6·3), students 171 (6·0), "officials" 114 (3·8) and traders 103 (3·5). In their summary, the authors state that the incidence is highest among those of a social class which has generally a low standard of living [a conclusion fairly obviously deducible without an elaborate analysis of occupation].

H. Harold Scott.

Federico Guillot, C. & Osvaldo Curci, A. Embarazo y lepra. Consideraciones acerca de la lepra en los estados fisiologicos femeninos. [**Pregnancy and Leprosy. A Study of Leprosy in Physiological Conditions in Women.**] *Rev. Argentina Dermatosifilologia.* 1946, July–Dec., v. 30, Nos. 3/4, 313–21. [13 refs.]

That males are infected with leprosy in greater numbers than are females is a fact generally acknowledged. Diniz, analysing 82,821 cases, found 57,008 male and 25,813 female, or 2·2 : 1, and the authors found among 5,705 Argentine lepers 3,682 males, 2,023 female, or 1·82 : 1. In Norway, it is true, female cases predominate, but in that country there are no new cases and the preponderance is ascribed to the greater length of life of the women. Predominance in males is probably due to more opportunities of exposure to and contraction of the infection, and to the intrinsic factor that the greater thyroid activity in women and " the presence of more iodine in the system " protects members of the female sex. In the young, where exposure is the same for boys as for girls, the numbers are closely alike.

After these preliminary statements, the authors pass on to consider in more detail leprous infection in women. Examination of 200 female lepers revealed *vulval lesions* in 13 per cent. Thiroux found Hansen's bacillus in the vaginal secretion in 27·2 per cent. of those with the lepromatous form of the disease, " much less in other forms." But it is acknowledged that the acid-fast organisms *may be* of the " smegma type " and not Hansen's organism. The *uterus* may itself show lesions and Kobayashi found the bacilli in the *ovaries* of six patients in an advanced stage of the disease. Infection of the *breasts* is not uncommon and organisms indistinguishable from *Myco. leprae* may be seen in the milk. As regards *menstruation*, leprosy infection in pre-puberty years may retard the onset, and during puberty may suspend the menses. On the other hand, menstruation may precipitate the leprotic reaction. Next, *fecundity* ; the relatively small number of births to lepers is, probably, not due to lowered fecundity but to the fewer opportunities for sexual congress or to precautionary measures taken. As for *pregnancy* itself, the drain on the system lowers resistance to disease and the history of leprosy appearing during or soon after pregnancy or parturition is not infrequent. The leprosy does not appear to affect pregnancy adversely, nor parturition, but the reverse is to be observed ; the exhaustion of the latter may lead to exacerbation of the disease, but not in the tuberculoid form.

A table is given with brief notes of 11 pregnancies in 6 subjects. Most proceeded normally but one had a tuberculoid reaction on the second day of the puerperium, another had a similar reaction on the fortieth day after parturition ; a third had a lepromatous reaction [time not stated] and a fourth had a similar reaction in the fifth week. [An interesting study.] *H. Harold Scott.*

Hallberg, V. **A New Method for Staining Leprosy Bacilli.** *Internat. J. Leprosy.* Cleveland, Ohio. 1946, Dec., v. 14, 67–73, 2 coloured figs. on 1 pl.

In 1941, the writer published a new method of staining tubercle bacilli with Nachtblau to take a dark blue colour. By the same means, lepra bacilli were detected in thick films of leprous venous blood. Lepra bacilli preparations preserved for years also took this stain, as did those of old cultures of various acid-fast bacilli, which do not stain well by the Ziehl-Neelsen method. The new method is particularly valuable in staining sections of tissue containing lepra bacilli. For details of the various solutions used the original paper must be consulted by those interested, for they occupy three small-printed pages, but

the following are the essential features of the method of staining thin films. A saturated stock solution of 5 gm. of Nachtblau in 100 cc. of 95 per cent. alcohol is made. Of this 10 cc. is added to 90 cc. distilled water, together with 10 per cent. potassium hydrate, maximum 0·2 cc., and 2·5 cc. of phenolum liquefactum. Plenty of the solution is poured on to the slide, heated to boiling and left for five minutes. The stain is poured off the film, which is decolorized with a solution of 25 per cent. HCl (3 cc.) and 100 cc. of 70 per cent. alcohol until no more blue clouds are given off. The preparation is washed in distilled water and counter-stained for 5–10 seconds with either neutral red, carbol-fuchsin, vesuvin or bismarck brown. Alternative methods are also given. A coloured plate illustrates the results. *L. Rogers.*

McDonald, S. **The Laboratory Diagnosis of Leprosy.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1947, Mar., v. 40, No. 4, 451–6, 3 figs. on 1 pl.

This is a timely paper on diagnosis of early cases of leprosy seen among recruits for the Indian Army. Before the recent war, most Indian Army men were obtained from the Punjab, where leprosy is comparatively rare ; but with recent recruitment from all over India many cases have been found, the early recognition of which is important. Many will be negative bacteriologically and the lepromin test is of little diagnostic value and lepromin is not always available. In such cases, the author advocates microscopical examination of a small piece of the suspected skin lesion, which has been removed under a local anaesthetic. Such examinations were carried out in 174 suspected cases of leprosy with 80 positive results ; only one of these was lepromatous and 79 were major or minor tuberculoid cases in which lepra bacilli are few and difficult to detect. Doubtful leprosy was diagnosed in 14 more ; in 6 others skin lesions were recognized ; and in the remaining 74 no diagnosis was reached. Sections stained by Ehrlich's haematoxylin and eosin showed the typical lesions of tuberculoid leprosy with epithelioid and round-celled infiltration and a few giant cells as a rule, together with characteristic degenerate nerve fibres surrounded by epithelioid and small round cells. The histological features which distinguish the lesions from tuberculous affections of the skin are the absence of caseation and the presence of round-celled peripheral neuritis in leprosy ; these features are illustrated by three micro-photographs. The nerve fibrils can be well shown by staining with Weigert's iron haematoxylin followed by Ponceau R-acid fuchsin and counterstaining with light green or very dilute Masson's aniline blue, with resulting deep pink nerve fibrils standing out against a green or blue background. While the author considers that skin leprosy affords the most rapid confirmatory evidence of the type of tuberculoid leprosy seen, he points out the need for expert interpretation of sections, since skin tuberculosis cannot be differentiated with absolute certainty on histological grounds alone.

L. Rogers.

Carbonell, M. & Contreras Dueñas. Exploración objetiva de los trastornos nerviosos iniciales de la lepra. [**Objective Testing for Early Nerve Disturbances in Leprosy.**] *Revista "Fontilles".* Valencia. 1946, July, No. 5, 403–6, 1 pl.

In children and in older persons of low intelligence little reliance can be placed on replies to subjective tests regarding loss of or change in sensation ; hence the greater value of objective tests. The authors stress the use of pilocarpine and of histamine in testing early leprotic lesions in which the bacilli are scarce and cannot be found. They particularly favour Degotte's method of painting the suspected area with tincture of iodine, injecting pilocarpine and dusting with

starch powder. In a healthy skin the iodide of starch reaction is very obvious in 4–6 minutes ; its absence in diseased areas indicates secretory defect due to nerve lesion. They next compare the action of histamine with that of Priscol, a substance the composition of which is not stated but which acts on the small arteries and arterioles rather than, like histamine, on the capillaries. Drops of this are placed on skin which is apparently healthy and on adjacent parts which are thought to be diseased and the skin is pricked with an ordinary hypodermic needle but *not deep enough to draw blood*. This is important, because not only are the nerve terminals in the skin acted upon, but also the vascular endothelium leading to a direct vasodilator action and a false positive result. Comparing Priscol with histamine, the initial erythema appears sooner, the secondary, reflex, erythema more quickly, and the third phase, the papule due to increased capillary permeability, earlier in the skin under the histamine drop than in that beneath the Priscol. Also the histamine papule is devoid of colour and shiny in the centre, whereas that of Priscol is more rounded and erythematous.

H. Harold Scott.

Faget, G. H. **Alopecia Leprosa in the United States.** *Internat. J. Leprosy.* Cleveland, Ohio. 1946, Dec., v. 14, 42–8, 5 figs. on 2 pls. [10 refs.]

"Alopecia is not a rare complication of leprosy in the United States. The presence of 10 definite cases among 360 patients (an incidence of 2·86 per cent.) demonstrates this fact.

"Alopecia leprosa occurs mostly in far advanced lepromatous disease of long duration."

Pogge, R. C. & Ross, Hilary. **Erythema Nodosum in Leprosy. A Study of the Pathogenesis with reference to Carbohydrate Metabolism.** *Internat. J. Leprosy.* Cleveland, Ohio. 1946, Dec., v. 14, 49–54. [19 refs.]

This paper deals with the pathology of evanescent red nodules appearing during lepra reactions, which closely resemble erythema nodosum associated with tuberculosis and streptococcus infections. At Carville, Louisiana, 46 per cent. of lepromatous cases had shown lesions in the past and 25 per cent. more during the previous two months. Mixed cases showed similar numbers, but among neural ones only 22 showed past and 11 per cent. recent lesions. Cases are, however, less frequent in patients treated by promin or diasone and in these cases the lesions tend to improve. Changes in carbohydrate metabolism in leprosy in relation to such lesions have been studied in 39 patients suffering from acute manifestations of leprosy, in 24 of whom erythema nodosum was observed, accompanied by chills and fever. Another 13 showed acute neuritis and 2 leprous lymphadenopathy. In all but the mildest cases, a definite increase in the fasting blood sugar was found. This hyperglycaemia in acute leprosy differed from that of other acute infections, in that it is essentially a rise in the glucose tolerance curve after a normal fasting sugar : in the present cases, the fasting sugar was elevated. None of the patients had suffered from glycosuria. Bile pigments in the urine were studied by the methylene blue test in 44 acute reactions, which gave positive tests in 72·7 per cent. such cases, as compared with 50 per cent. in non-reacting cases. Seven had previously showed negative bile tests, and they reverted to negatives when the reaction was over. It is thus likely that hyperglycaemia in acute leprosy is related to metabolic functions of the liver. Further, 35 patients with only chronic symptoms showed normal fasting blood sugar. In 40 cases of lepra fever, protomine zinc insulin was given in daily doses of 25 to 40 units for three days, with resulting clinical improvement and rapid subsidence of severe pain in neuritis cases. *L. Rogers.*

FAGET, G. H., POGGE, R. C., JOHANSEN, F. A., FITE, G. L., PREJEAN, B. M. & GEMAR, F. **Present Status of Promin Treatment in Leprosy.** *Internat. J. Leprosy.* Cleveland, Ohio. 1946, Dec., v. 14, 30–36, 1 fig. [10 refs.]

This important paper brings up to date the results of trials of promin at the U.S.A. leprosy settlement in Louisiana [see this *Bulletin*, 1946, v. 43, 343].

Promin treatment has now been carried out on 177 cases for periods of from 1 to 5 years, during which 268,836 grammes have been used at a cost of $6,986 in the last fiscal year, but with a saving of $7,419 in the reduced cost of dressings and bandages for ulcers. In 23·2 per cent. the treatment was discontinued for various reasons such as absconding or death. Of 137 remaining patients, who have been treated regularly, 103, or 75·3 per cent., were lepromatous, 2·9 per cent. neural and the rest mixed cases. During the last two years, intravenous injections have been given six days a week for two weeks, followed by one week's rest, making approximately 207 injections a year.

On this dosage in only four cases have the red cells fallen below 3,000,000 per cmm., and these quickly recovered to permit treatment to be continued. In only 3·38 per cent. was treatment stopped on account of renal insufficiency and in only 1·13 per cent. had the injections to be stopped on account of skin reactions. Ulcers which healed rarely relapsed, as they frequently do under other forms of treatment, and the healing of chronic ulcers of long duration is one of the most gratifying results of promin. Inflammatory eye complications have greatly decreased under this drug ; it is also of use in leprous laryngitis, and no tracheotomy has been required during the last three years at the Leprosarium.

Bacteriological improvement has been equally apparent during the last three years and 5·1 per cent. of patients have been passed by the Parole Board and a further 8·7 per cent. have had six or more consecutive monthly negative skin examinations for lepra bacilli. In another 24·8 per cent., or 34 cases, acid-fast bacilli have nearly disappeared from the skin lesions. A diagram shows that the decrease in the bacilli is very marked in the fourth and fifth years of treatment. Clinical improvement is equally evident, in the form of diminution and disappearance of nodules. It is now possible to report that promin treatment results in improvement in all major chronic manifestations of leprosy, accompanied by bacteriological and histological improvement. *L. Rogers.*

MOM, A. M. Quimioterapia de la lepra con promin. [**Promin in the Treatment of Leprosy.**] *Prensa Méd. Argentina.* 1946, Nov. 29, v. 33, No. 48, 2390–404, 12 figs. [12 refs.]

The work of FAGET and his collaborators on the treatment of leprosy with promin has been referred to in this *Bulletin* [1944, v. 41, 494]. Since then FAGET and POGGE have made a second communication regarding 137 patients [this *Bulletin*, 1946, v. 43, 343]. The present author has treated 56 patients with promin. The drug is put up in 5 cc. ampoules (each containing 2 gm.) or in 12·5 cc. ampoules (5 gm.) and administered intravenously diluted with saline ; it is not well tolerated when given by mouth. The routine of administration is 2 gm. daily for a week, then 5 gm. for 6 days a week (omitting Sundays) for 4 months and the course is repeated after an interval of a fortnight. The results are presented in a series of tables which deal with 54 of these patients. The maximum dosage administered was 1,810 gm. The improvement depends on the dosage. Thus, of 21 receiving up to 2 gm. daily, 12 showed improvement; 4 out of 7 receiving 2–3 gm. daily ; 17 out of 22 receiving 3–4 gm., and all of four receiving 4–6 gm. daily improved. Six out of 14 receiving treatment for less than 8 months improved, but 31 out of 40 who were treated for more than 8 months were benefited. By improvement is implied fading of the erythema,

lessening to actual disappearance of the infiltration and nodules, diminution of the neuritis, healing of ulcers, and lessening in numbers of the bacteria. Thirty-seven were observed after 10–12 months' treatment ; 30 had improved, 6 were stationary [one is not accounted for] and of 12 who had had 5–10 months' treatment five improved, six remained stationary and one was worse. The fact must not be omitted that all received a minimum of 500 mgm. of ascorbic acid intravenously each day. The promin action may be accompanied by a haemolytic type of anaemia and a degree of leucopenia, but these yield to preparations of iron in the milder degrees and to liver in the more severe. The good effects of promin appear to be limited to the lepromatous forms of the disease ; it had no effect on tuberculoid leprosy. An added note states briefly that study is being undertaken of combined treatment by promin and chaulmoogra oil in large doses intramuscularly and by mouth, and " first impressions are that the results are better than with promin alone." Illustrations of patients show well the changes effected by the use of promin. *H. Harold Scott.*

FERNANDEZ, J. M. M. & CARBONI, E. A. **The Action of Diasone in the Treatment of Leprosy. (Preliminary Report.)** *Internat. J. Leprosy.* Cleveland, Ohio. 1946, Dec., v. 14, 19–29, 8 figs. on 2 pls.

After references to previous trials of sulphones, the authors record their experience with diasone orally in 42 cases, in which at least one series of treatment had been completed. The drug is put up in 5-grain capsules, one of which is first given daily by the mouth and increased progressively to three or more. As it tends to produce anaemia and its concentration in the blood tends to decrease after 6 to 8 weeks' treatment, the authors advise giving the drug daily in eight-week courses with three to four weeks' rest between each course. If it is well tolerated, the daily dose may gradually be pushed up to as much as eight 5-grain capsules, but the average daily dose which is best tolerated is six capsules containing 2 grammes. As reactions may be produced, constant supervision of the patients is necessary. With the exception of severe anaemia in one patient, no serious complications have been seen. Intolerance is most frequently seen after two weeks. It disappears with temporary suspension of the treatment or the administration of liver, iron and vitamin B complex. Asthenia and depression or a cyanotic colour due to the formation of methaemoglobin are also signs of intolerance. Headache, nausea or loss of appetite and fatigue may occur. Skin or eye reactions were noted in 74·2 per cent. of the patients. Increase in weight and general improvement in health occurred in many of the cases. In 29 of 35 cases, or 82·8 per cent., there was a fall in the blood count varying from 500,000 to 2,000,000, usually after 20 gm. of the drug had been given ; in all but one it responded to anti-anaemic treatment, in the remaining case a blood transfusion was required. Only slight falls in the leucocytes were noted, but they should be watched for.

The results of this trial are given in a table. Most of the cases were advanced lepromatous ones ; only a small number were L_1 or Ns cases. After one course of treatment in 26 cases, 13 were unchanged, 10 improved and 3 much improved. After two courses in 11 cases 4 were unchanged, 5 improved and 2 much improved, but all of 5 cases were much improved after three courses of the drug. Clinically, softening and breaking down of nodules with flattening and reduction in their bulk was the main feature. Re-absorption may be only central or it may be complete. Ulcers of skin or mucous membranes improve and may heal. Bacteriological examinations did not show disappearance of the lepra bacilli, but granular forms predominated. As the result of eight months' trial, no case became worse and in nearly 60 per cent. there was marked improvement, which increased with the duration of the treatment. The oral method of administration

is a great advantage in such a chronic disease as leprosy. Further experience is required to enable definite conclusions to be reached regarding the value of the diasone treatment. *L. Rogers.*

Mom, A. M. & Bernal, Maria. **Influence of Tyrothricin in the Sterilization and Cicatrization of Leprous Ulcers. Report of Treatment in Fifteen Patients.** *Internat. J. Leprosy.* Cleveland, Ohio. 1946, Dec., v. 14, 7–18, 8 figs. on 2 pls.

Tyrothricin is a mixture of two polypeptides; gramicidin from *Bacillus brevis*, which is highly bactericidal for Gram-positive micro-organisms only; and tyrocidin, which is active against both Gram-positive and Gram-negative micro-organisms, but is highly haemolytic and toxic to the kidneys and liver. The combination of the two substances, therefore, can only be used for local application and not parenterally, so it has been tried in the treatment of leprous ulcers.

Freshly prepared 2 per cent. solutions in alcohol, diluted with sterile distilled water to give a cloudy preparation of the compound in colloidal suspension, are used in a strength of 33 mgm. in 100 cc. (1 cc. of stock solution in 60 cc. of distilled water). With this, leprous ulcers are sprayed by an atomizer daily for the first week, and then every second day for from 32 to 138 days after cleansing the ulcers at first with warm saline solution. The ulcers are then covered with sterile gauze and any exuberant granulations treated with silver nitrate. If a patient has less than 4,000,000 red corpuscles per cmm., liver extract and ferrous salts are given. Vitamin C may also be given.

Fifteen patients were treated, in whom ulcers had been present for from 1 to 15 years. From the first application, the preparation had a remarkable analgesic effect. In six of seven cases with frequent previous attacks of erysipelas these did not recur, and in the seventh only on one occasion. More rapid clearing up and cicatrization took place than with any other treatment. Bacterial sterilization of the ulcers was obtained in 10 to 35 days, including disappearance of *M. leprae* after 10 to 21 applications. However, *in vitro* tests did not afford any evidence of a bactericidal effect of the preparation on the lepra bacilli. Short notes of the cases are recorded; they show complete success in healing the ulcers in 14, and relative success in the remaining one, after from 19 to 75 days' treatment with 13 to 33 applications. In all cases the ulcers became bacteriologically negative before healing. Photographs showing the condition before and after treatment in four cases are recorded. *L. Rogers.*

Languillon, J. Le traitement des ulcères plantaires de la lèpre par les injections intra-musculaires d'acécoline et d'angioxyl. [**The Treatment of Leprous Plantar Ulcers by Intramuscular Injections of Acécoline and Angioxyl.**] *Bull. Soc. Path. Exot.* 1946, v. 39, Nos. 9/10, 339–41.

Seven cases of very chronic plantar ulcers, three of them of from 5 to 7 years' duration, are reported on. The first five were treated by the method of Tisseuil, namely by a series of twelve injections on alternate days of 20 cgm. of Acécoline (a solution of acetylcholine hydrochloride) intramuscularly. Rapid improvement took place and three of the patients, who had been bedridden for months, were able to resume their work on plantations. A sixth was treated with similar success by twelve injections of forty units of angioxyl intramuscularly, and the seventh case was presumably treated by the same drug, although this is not explicitly stated. The healing effects of the drugs were very marked.

L. Rogers.

CHALA, J. I. **Control of Leprosy in Colombia.** *Internat. J. Leprosy.* Cleveland, Ohio. 1946, Dec., v. 14, 60–66, 1 pl.

The control of leprosy in Colombia is based on the general belief that it is a communicable infectious disease, either through direct or indirect contact. Isolation of all open cases is carried out in leprosaria, at home or in special hospital wards. Closed ones are treated by physicians in dispensaries or by the National Health Department. Healthy children of leprosy patients are cared for. Information on preventive measures is disseminated and research carried out at the Federico Lleras Acosta Institute. The large leprosarium at Agua de Dios was founded in 1870 at 1,350 feet above the sea in a dry climate. It accommodates 4,484 patients and about 5,000 healthy persons ; eight physicians are employed including specialists. At Contratación, there are 2,296 patients and about 4,000 healthy persons ; and at the island settlement of Cano de Loro, founded as early as 1791, there are 506 patients and 200 healthy persons. Thus there are 11,730 healthy persons in the leprosaria, contrary to law, including many children. Patients frequently escape, and there are many marriages and births. The cost of isolation is a severe tax on the treasury, yet the leprosaria do not at present provide an adequate prophylactic service. Moreover, 189 open cases are isolated at home under supervision.

In 1932, a new law provided for an anti-leprosy programme for isolation of all open cases and the treatment of closed ones at dispensaries of which there are now 11. Healthy children, who number 2,530, are to be removed from the leprosaria. Among 1,048 children of lepers, who have already been looked after in separate institutions, only 12 have yet developed the disease. Chaulmoogra preparations are used in treatment ; with their use, about 54 per cent. improve, 34 per cent. remain stationary and 12 per cent. become worse. The health authorities propose completely to reorganize the methods of control and the present leprosaria. *L. Rogers.*

SUAREZ, J. **National Leprosy Service in Bolivia.** *Internat. J. Leprosy.* Cleveland, Ohio. 1946, Dec., v. 14, 55–9.

HELMINTHIASIS.

MARKELL, E. K., MULLINGER, P. E. & SCHNEIDER, D. J. **Intestinal Parasitic Infections in Naval Personnel.** *Amer. J. Trop. Med.* 1947, Jan., v. 27, No. 1, 63–5.

The authors studied the stools of 1,153 members of the U.S. Forces, and of 103 civilians, in the School of Tropical Medicine at the Naval Hospital, Treasure Island, and were satisfied that the series represented a random selection of the patients. Direct-smear, concentration and staining methods were employed.

The percentages of intestinal parasites found and the " Theoretical Percent. Infection " for the various amoebae are given in two tables, each group of patients being recorded separately.

Among the naval and marine patients, 40·3 per cent. were infected with more than one parasite. Over 80 per cent. of the civilians grouped harboured one or more parasites.

Detailed figures are given in respect of the protozoal and helminthic parasites encountered, and their significance is discussed.

H. J. O'D. Burke-Gaffney.

DENHOFF, E. **The Significance of Eosinophilia in Abdominal Complaints of American Soldiers.** *New England J. of Med.* 1947, Feb. 6, v. 236, No. 6, 201–6. [14 refs.]

A review of 59 cases, of which 79 per cent. revealed signs of intestinal helminthic infections.

MEDULLA, C. Il problema della Schistosomiasi in Libia. [**The Problem of Schistosomiasis in Libya.**] *Arch. Ital. Sci. Med. Colon. e Parassit.* 1940, May, v. 21, No. 5, 217–39, 4 figs. [75 refs.]

STEPHENSON, R. W. **Bilharziasis in the Gezira Irrigated Area of the Sudan.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1947, Mar., v. 40, No. 4, 479–94. [14 refs.]

Schistosomiasis is endemic in the Sudan, both *S. haematobium* and *S. mansoni* being found north of latitude 12 N., and chiefly *S. mansoni* south of 8 N.; between these is an area apparently free. The Gezira area is the site of a large irrigation scheme, in which water is taken from the reservoirs formed by the dam on the Blue Nile at Sennar. There are 600 miles of main channels, and 2,000 miles of minor distributaries. Water enters the system except from April to July each year, and in most of the area the crops are watered only by day; in the Abdel Magid area, however, under Government supervision, crops are watered throughout the 24 hours, and there is, therefore, no storage of water in the minor distributaries. The crops are cotton, millet and beans. The population is 349,000 in the Southern District, 170,000 in the Northern District; there is a yearly influx of immigrants (now about 90,000) for cotton picking. There are 50 dispensaries in the area.

Before the irrigation scheme was started, this area was almost free from schistosomiasis, but as the canals were opened, *Bulinus* and (less rapidly) *Planorbis* snails established themselves and multiplied. *S. haematobium* was spreading by 1927. To prevent its further spread, certain measures were taken :—examination of immigrants, of whom about 17·5 per cent. were found infested with *S. haemabotium* (it was not feasible to examine for *S. mansoni*); treatment campaigns; annual surveys; examinations of urine at the dispensaries; siting of villages away from canals, provision of wells and latrines; disinfection and drying out of canals; propaganda. These measures proved unsuccessful; the people constantly used the water of the canals for domestic purposes, they bathed and defaecated in canals, latrines were not used, snails resisted drying, propaganda was a failure. The minor distributaries are the main source of infection; they are prolific of permanent grasses and floating weeds, which create ideal conditions for the snails. Infection in the fields is unlikely.

During 1942, 1944 and 1945, the author examined 4,773 persons from a number of villages, and found 21 per cent. of adults and 45 per cent. of children infested with *S. haematobium*; the extremes were 2 and 66 per cent.; yet in earlier surveys the highest figures had been 0·77 and 1·5 per cent. for adults and children respectively. The author cannot find an explanation of this great discrepancy.

In some villages, examinations have been made for *S. mansoni*, and the author notes that no one method of stool examination will reveal all cases; he found *S. mansoni* in 5 per cent. in some places, and notes 3 cases in which the eggs were found in urine. The dispensary results, for both *S. haematobium* and *S. mansoni*, gave percentages much below those of the author's surveys.

Snail infestation is heavy throughout the area, but the numbers found in canals in which water is stored at night are up to 10 times as great as those in canals used throughout the 24 hours.

The position seems to be deteriorating, and the efforts to prevent infection of canals by carriers have failed. It is therefore necessary to reduce the number of snails in the canals, by reducing the growth of weeds (which are not encouraged by 24-hour movement of water), and by snail clearance as practised in Egypt. The author repeats the question posed in Egypt by Scott, whether improvement in economic conditions warrants impairment of the health of the population; the wise use of irrigation does not include the exposure of the people to a high rate of infection with schistosomes. *Charles Wilcocks.*

Mukerji, A. K., Bhaduri, N. V. & Narain, S. **Experiments on the Transmission of Human Schistosomiasis in India.** *Indian J. Med. Res.* 1946, Oct., v. 34, No. 2, 311–15. [10 refs.]

The authors were unable to transmit *S. haematobium* and *S. mansoni* infections, derived from African troops, through the common Indian snails.

See also p. 618, Ibrahim, **Bilharzial Granuloma of the Conjunctiva.**

Weller, T. H. **The Diagnosis of *Schistosoma mansoni* Infections. Note on the Use of a Rectal Scraper.** *Amer. J. Trop. Med.* 1947, Jan., v. 27, No. 1, 41–4, 2 figs.

The author describes a rectal scraper for the collection of mucus and faecal material in the diagnosis of *S. mansoni* infections. The scraper was designed to have one (and ultimately three) grooves on its end, and to fit into a rubber stopper so that the whole could be placed in a moist test-tube for transport. The details of manufacture are described, and the scraper is illustrated by a diagram and a photograph.

Preliminary tests on 764 persons, of whom 157 showed evidence of schistosomiasis, indicated that the single-grooved scraper was less efficient in the detection of *S. mansoni* eggs than the routine acid-Triton NE-ether method of stool concentration. The scraper method detected 60 per cent. of positives, whilst stool concentration detected 76 per cent.: 56 men were positive by both methods.

The employment at a later stage of the 3-grooved scraper suggested that the likelihood of increasing the percentage of positives might be increased by its use.

It is suggested that, in its present state, the scraper technique might be a useful complement to stool concentration methods or an alternative where the latter were not practicable. A plea is made for the further investigation of the technique. *H. J. O'D. Burke-Gaffney.*

Williams, F. Eleanor. **The Complement Fixation Reaction in Asiatic Schistosomiasis employing Cercarial Antigen** (*Schistosoma spindale*). *Trans. Roy. Soc. Trop. Med. & Hyg.* 1947, Mar., v. 40, No. 4, 421–34, 3 charts.

The author reviews literature in which it has been shown that the complement fixation test with cercarial antigen (*Schistosoma spindale*) is capable of detecting infections with the schistosomes of man. The antigen is prepared, according to the method of Fairley (who did most of the former work), from livers of *Planorbis exustus* heavily infected with *S. spindale*, by extraction with alcohol. For details of the test the original paper must be consulted. The author used it in testing 560 men of the R.A.A.F. who had been exposed to infection with *S. japonicum* by bathing in a notorious river in the island of Leyte, Philippine Islands. The results were as follows:—sera from 169 were positive, and ova

were demonstrated in the stools of 144 of them ; sera from 391 were negative, but ova were found in 5 of them. Of these 560 men, 195 had previously been regarded as infected, and given treatment ; of the 365 previously regarded as not infected, 34 (9·3 per cent.) had a positive test, and 27 (7·4 per cent.) showed ova ; 26 of the 27 with ova had a positive test. Persistence of a strongly positive test (7 M.H.D. or over) for 6 months after treatment is evidence of persisting infection. No false positive results were found.

This test, therefore, is of outstanding value in diagnosis, and is more sensitive and less tedious than repeated examination of the stools for ova ; it is therefore an essential part of an investigation of any outbreak, but both tests are necessary to determine the true incidence of the disease. If the test remains positive and eggs cannot be found, the explanation may be that the infection is predominantly or exclusively with male worms.

The original antigen was prepared 18 years ago in India, but was still active ; another antigen recently prepared in somewhat the same manner had almost equal potency. *Charles Wilcocks.*

TILLMAN, A. J. B. **Schistosomiasis Japonica with Cerebral Manifestations : Report of Seven Cases.** *Arch. Intern. Med.* 1947, Jan., v. 79, No. 1, 36–61.

The author briefly traces the life-history of *S. japonicum*, noting that in their passage from skin, through the systemic circulation to the mesenteric veins, the larvae may give rise to a patchy pneumonic condition which, though not recognized clinically, is often suggested by the patient's history. Ova from the mature worms in the mesenteric radicles often reach the liver, but may also pass to the systemic circulation through the haemorrhoidal plexus and thence to the lung and the general circulation, and to distant organs. It has been said that adult *S. mansoni* may migrate and be carried to the pulmonary arteries, and the same may possibly be true of *S. japonicum*, though it has not been proved. Ova may be deposited in the tissues of the central nervous system and produce severe lesions there. The author gives details of 7 cases in which this presumably happened, but since none of the patients died, pathological confirmation of the clinical diagnoses was not possible.

The patients were American soldiers in the island of Leyte, where the disease is endemic, and where, in 1945, it assumed " epidemic " proportions among the troops. Very full accounts are given of the laboratory findings and clinical condition of these men. Ova were found in the faeces of 4 of them (but the stools may be negative many times before eggs are found) ; leucocytosis (16,500 to 27,400) and eosinophilia (10 to 61 per cent.) were constant. Prodromal symptoms included fever, cough, malaise, oedematous rash, pain in chest or abdomen ; the cerebral manifestations included headache, disorientation, lethargy, confusion, paraplegia, triplegia or quadriplegia, involvement of the cranial nerves, and various mental changes. " Aphasia, amnesia, blocking, confusion, disorientation; defective memory and coma were outstanding. Spasticity, occasionally early flaccidity changing to spasticity, rigidity, hyperreflexia, pathologic reflexes and loss of superficial reflexes were common to all." Spinal fluid was examined on 11 occasions, but was always normal.

It will be noted that the diagnosis of schistosomiasis was made on clinical findings only, in some of these patients. The author considers that this disease should be suspected in a patient exposed to infection and presenting an urticarial eruption (in a previously non-allergic person), pulmonary symptoms, vague abdominal aches, leucocytosis over 15,000 and eosinophilia of 40 per cent. Cerebral involvement is indicated where the nervous signs named above appear. The condition must be differentiated from other worm infestations.

The treatment of *S. japonicum* infection is in a state of flux ; the author gave Fouadin (45 cc. or more, in 17 days) and potassium antimony tartrate (1 per cent. solution intravenously ; the limits of dosage are not clearly indicated). He found that the latter drug produced considerable electrocardiograph changes, but without clinical evidence of cardiac involvement. These were beneficial in the cerebral cases, but did not effect complete cure, because there were still symptoms after drug treatment was ended, the permanence of which cannot yet be assessed. *Charles Wilcocks.*

Lippincott, S. W., Paddock, F. K., Rhees, M. C., Hesselbrock, W. B. & Ellerbrook, L. D. **Tests of Liver Function in Schistosomiasis Japonica with particular reference to Antimony Treatment and with Report of Two Autopsies.** *Arch. Intern. Med.* 1947, Jan., v. 79, No. 1, 62–76, 8 figs. [Refs. in footnotes.]

Two American soldiers, infected with *S. japonicum* on the island of Leyte, and given treatment with Fouadin or potassium antimony tartrate, died from other causes and were brought to autopsy. In one, small abscesses were found in the submucosa of the intestine, without ulceration, from the jejunum to the descending colon, and in the liver. These were, presumably, reactions to ova of the worms. In the other, abscesses were found in the liver, small and circumscribed, but not in the intestine. They were not numerous enough to suggest that they would have impaired liver function.

In a group of 481 soldiers similarly infected, tests of hepatic function were made, during and after treatment, by the following tests, the percentages of abnormalities are given in brackets :—globulin (5), formol gel (1), icterus index (4), serum bilirubin (6), urobilinogen (nil), hippuric acid (5), galactose tolerance (4), and bromsulphthalein retention (12). Repeated bromsulphthalein and serum bilirubin tests showed a definitely increased incidence of mild abnormalities toward the end of, and after, treatment with trivalent antimonials ; this persisted for 90 days or more after the end of treatment, but decreased later. " The evidence suggests that antimony treatment has a minor direct or indirect effect on the liver." *Charles Wilcocks.*

El Kordy, M. I. **On the Incidence of Hydatid Disease in Domestic Animals in Egypt.** *J. Roy. Egyptian Med. Ass.* 1946, July–Aug., v. 29, Nos. 7/8, 265–79, 4 figs. [14 refs.]

A survey of the incidence of hydatid disease in camels, buffaloes, cattle and sheep slaughtered in the Cairo abattoir, revealed that the highest rate of infection occurs in camels (31 per cent.) and the lowest in sheep (1·5 per cent.). Buffaloes (16 per cent.) and cattle (10 per cent.) show a moderate infection rate. The average number of hydatid cysts was found to be nearly the same in each kind of animal, namely 3·5 and 4. Multilocular and multicystic cysts occur, but are rare. The highest percentage of fertile cysts is found in camels (68·42 per cent.) and in sheep (63·64 per cent.) ; for this reason, together with its relatively high infection rate, the camel is considered to be the optimum intermediate host in Egypt. Buffaloes are ranked next in importance with an incidence of 16 per cent. infection and a percentage of fertile cysts of 51·18 per cent. Various organs may be infected, but cysts are most commonly found in the liver and lungs where their occurrence varies in different kinds of host. In camels, the lungs are more frequently infected than the liver while the reverse holds in the case of buffaloes, cattle and sheep.

From the results of precipitin and complement fixation tests for the diagnosis of hydatid infection in camels it is concluded that these tests cannot be relied upon when applied to domestic animals. *J. J. C. Buckley.*

COLE, G. **The Australasian Hydatid Registry.** *Health Bull.* Melbourne. 1945, July–Dec., Nos. 83/84, 2255–61.

"This valuable collection of recorded cases of hydatid disease in Australia and New Zealand was instituted in the year 1930 at the suggestion of Sir Louis Barnett, Emeritus Professor of Surgery at the University of Otago, and Chairman of the New Zealand Hydatid Research Committees and is now housed in the precincts of the Royal Australasian College of Surgeons, Melbourne."

Up to 31st March, 1945, 1,802 cases had been recorded, of which 871 were from New Zealand and 931 from Australia. Of the latter, 350 were recorded as being from Victoria; geographical and other data concerning these are tabulated. Thus, 58·5 per cent. of the cases are males, 41·5 per cent. females. In the age group under 20, there are 18·5 per cent. males and 16·5 per cent. females; in the age group 21–60, 66·8 per cent. males and 73·1 per cent. females; in the age group over 61, 14·1 per cent. males. In 198 of the case-records, no information is available concerning the history of association with dogs. Of the remainder, 83·5 per cent. furnished positive information on this count.

Concerning the sites of the cysts in the 1,802 cases on the Register, the following figures are given: liver (including secondary peritoneal) 1,140 cases; lung, 441; muscle and fascia, 82; bone (including spine), 46; kidney, 39; spleen, 23; brain, 16; heart, 6; thyroid, 2: breast, 3; parotid, 1; prostate, 1; pancreas, 1. *J. J. C. Buckley.*

DORRANCE, G. M. & BRANSFIELD, J. W. **The Evaluation of the Surgical Treatment of Recurrent Echinococcic Cysts of the Liver followed by Deep X-Ray Therapy.** *Amer. J. Trop. Med.* 1947, Jan., v. 27, No. 1, 77.

Report of a case with successful result.

GELLHORN, A., ROSE, H. M. & CULBERTSON, J. T. **The Plasma Antimony Concentration and the Urinary Antimony Excretion in Man during Therapy with Organic Antimony Compounds.** *J. Trop. Med. & Hyg.* 1947, Feb., v. 50, No. 2, 27–31, 2 figs.

The present investigation dealing with the plasma concentration and urinary excretion of antimony arose from the use of antimonials in the treatment of filariasis by CULBERTSON and colleagues [this *Bulletin*, 1946, v. 43, 763]. The plasma determinations were made on 40 Porto Rican patients infected with *W. bancrofti*, some of whom were treated intravenously with therapeutic doses of the tervalent antimonials Anthiomaline, Fouadin and tartar emetic and others with the pentavalent compounds Neostam, Neostibosan and Stibanose. The number of days of treatment and the total dosage of antimony given are indicated in the text. Urinary excretion after treatment with Neostibosan and Fouadin was studied on 24-hour samples in 5 patients; two of them had loaiasis and the remainder, *W. bancrofti* infections. All the patients appeared to be in good health at the time of the experiments.

The rhodamine B method as used by GELLHORN *et al.* (*J. Pharm. & Exper. Therap.*, 1946, v. 87, 159) was employed in the antimony estimations. After treatment with the tervalent compounds or with Stibanose less than 0·05 mgm. Sb was present in 100 ml. of plasma. The highest plasma level of Sb after Neostibosan was 1·05 mgm. and after Neostam 0·18 mgm. in the same volume of plasma, although the amounts of Sb injected were not very different in the two cases. The reason for the lower plasma levels after treatment with tervalent compounds was partly explained by the smaller amount of Sb given but this was not the whole explanation. The high level of Sb in plasma after Neostibosan suggests that this might be the drug of choice in treatment of

blood parasites. A greater absolute amount and much higher percentage of administered Neostibosan was excreted in the urine than was the case with Fouadin, so that in the case of impaired renal function during therapy with the former substance a rapid accumulation of Sb in the body could be expected. The known greater toxicity of tervalent compounds was confirmed.

J. D. Fulton.

CLARK, W. B. **Onchocerciasis in Guatemala : A Preliminary Report.** *Arch. Ophthalmology*, 1946, Nov., v. 36, No. 5, 644–5.

A study of 1,215 patients.

SHOOKHOFF, H. B., BIRNKRANT, W. B. & GREENBERG, M. **An Outbreak of Trichinosis in New York City, with special reference to the Intradermal and Precipitin Tests.** *Amer. J. Pub. Health.* 1946, Dec., v. 36, No. 12, 1403–11, 1 fig. [25 refs.]

The authors investigated the largest outbreak of trichiniasis in the history of New York City Health Department, which occurred in 1945. After eating pork from a single wholesaler, 84 persons became ill and the pork eaten by 53 of them was traced to a single retail store. The pork had not been subjected to the necessary freezing processes during preparation. It was not possible to get portions of the pork eaten, but later samples of pork were all negative. A useful table gives the histories of 25 outbreaks of trichiniasis which have occurred in the United States, Germany, England and Norway since 1900.

The incubation period of 62 persons during the present outbreak varied from 2 to 35 days. In 46 of them (74 per cent.) the first symptoms occurred between the fifth and the seventeenth days. None of them was critically ill and none died. A table indicates that deaths occurred in only 12 of the other outbreaks listed since 1900. The mortality in the four largest of these outbreaks, totalling more than 100 persons, was less than 1 per cent. The authors discuss the mortality in these outbreaks and point out that the comparatively few deaths among them contrast markedly with the mortality experienced during the last century (see GOULD, *Trichinosis*, Chas. C. Thomas, Springfield Ill., 1945, p. 279). The authors believe that the reduced severity of trichiniasis is due to reduction in the dosage as a result of public health and other control measures and to improved eating habits. In the outbreak reported and in all but two of those which have occurred since 1900, the disease has been acquired from sausage, which dilutes the pork and is itself diluted with liver, blood, etc., scraps from many pigs being used. In Stüttgart, when steaks of polar bear meat were the cause of an outbreak, 12 out of 88 infected persons died.

The symptoms are recorded in a table. By far the commonest were oedema of the eyelids (81 per cent.), muscle pains (72 per cent.) and fever (71 per cent.). The order of the appearance of the symptoms is discussed. Only 7 out of 57 persons had classical gastro-enteritis.

Eosinophilia was studied by means of differential counts done on 72 persons. The authors regarded 10 per cent. or more of eosinophils as an eosinophilia, but state that counts under 10 per cent. cannot be ruled out unless the total number of white cells is considered. A table shows that 64 of the 72 persons examined had more than 10 per cent., and of the eight others only one had less than 5 per cent. In 9 of 18 outbreaks since 1900 all those affected had an eosinophilia and in 9 others most of them had. The authors state that it is "generally accepted that determination of the eosinophil count is the most useful single laboratory test for the early diagnosis of trichinosis." The precipitin reaction was done on 40 out of the 84 persons. Only two of these were completely negative. In five the titre was 1 : 160 (doubtful positive); the remainder varied from

1 : 320 to 1 : 1,280. The earliest positive was found on the 7th day of the illness. The authors believe that practically all subjects eventually develop a positive precipitin test, but that it may be developed too late to be of practical value. The test is, however, valuable as confirmation of clinical evidence, although false positives are " not infrequent ".

The intradermal test was done on 21 persons. Only 11 of them were positive at the first test, but in 15 the test was eventually positive. The earliest positive occurred on the 6th day of the illness. A table gives the results in relation to the duration of the illness. The authors think the value of this test is limited, because it may be negative early in the illness and may not become positive for several weeks, perhaps not at all. They state that it is usually considered that the intradermal test becomes positive during the third week after infection and that the precipitin test first appears at the end of the fourth week, but they believe that these statements give a wrong impression, because they found that the precipitin test tended to become positive before the intradermal test and that the former test is far more likely to be positive during the second week and is more often positive during the later weeks. In 12 cases, they did both tests simultaneously and repeated this on two persons. From the results, shown in a table, they conclude that the precipitin is the more useful test of the two and has the advantage that it is easier for the practitioner to send a blood sample for test than to do a skin test at the bedside with perhaps a second visit to read a possible delayed reaction ; but the intradermal test gives fewer false positives. It is best to use both.

No biopsies were done. The authors believe that biopsy has less value than the precipitin and intradermal tests. It is not readily repeated, so that it must be delayed until the optimal time, *i.e.* the fourth week after symptoms appear, when most of the larvae will have reached the muscles. It is also expensive and disquiets the subject. In nine of the other outbreaks listed by the authors, 61 biopsies were done and only 39 were positive. *G. Lapage.*

DEFICIENCY DISEASES.

SMITH, D. A. **Nutritional Neuropathies in the Civilian Internment Camp, Hong Kong, January, 1942–August, 1945.** *Brain.* 1946, v. 69, No. 3, 209–22, 3 graphs. [40 refs.]

Among the civilian internees in Hong Kong there were many hundreds of cases of subacute wet beriberi, " burning feet " syndrome, and amblyopia. There were a few cases of typical dry beriberi. In this paper the clinical features and response to treatment of these syndromes are described, and their incidence discussed in relation to diet and to the prevalence of other deficiency states. The diet throughout was grossly deficient in animal protein, B vitamins, calcium, and phosphorus.

Subacute Wet Beriberi.—The diagnosis was only made in the presence of oedema, neurological signs, and a rapid response to treatment with vitamin B_1. In most cases there was tenderness of the calves and over the nerve trunks on pressure. Response to treatment with synthetic vitamin B_1 was uniformly satisfactory. There were 844 cases out of a population of about 2,500. There was a close correlation between the incidence of beriberi and the vitamin B_1 : carbohydrate ratio of the diet. It is suggested that the critical value of this ratio, below which symptoms developed, was 0·4 mgm. per 1,000 non-fat calories.

Chronic Dry Beriberi.—Only 6 cases were seen, with flaccid paraplegia and absent reflexes. Response to treatment with a mixture of synthetic B vitamins was more rapid than to vitamin B_1 alone.

"Burning Feet" Syndrome.—There were in all 756 cases of this condition. The characteristic features were "pins and needles" in the feet, shooting pains, and aching of the feet and legs. The pain was worse at night. It was usually described by the sufferers as a sensation of intense burning or freezing. No changes in skin temperature or vasomotor abnormalities were detected. In some cases there was plantar anaesthesia, in others hyperaesthesia. Reflexes were exaggerated in the early cases, but later, as anaesthesia developed, the ankle-jerks and then the knee-jerks were lost. These latter findings were present in 35 per cent. of the cases, and are attributed to a mild degree of chronic dry beriberi, since treatment of the "burning feet" syndrome with vitamin B_1 caused improvement, but not freedom from pain, in the same proportion of cases. [It is not stated whether the patients who improved were those with anaesthesia and loss of reflexes.] The response to treatment was, in general, disappointing: neither vitamin B_1 nor nicotinic acid gave significant relief from pain. Slow improvement occurred when soya-bean, rice-polishings, or yeast were added to the diet. The incidence of "burning feet" syndrome was closely correlated with that of pellagra and ariboflavinosis. Since riboflavin, as well as nicotinic acid, has been found ineffective in treatment, the author attributes the condition to deficiency of some other member of the vitamin B complex. The work of GOPALAN [this *Bulletin*, 1946, v. 43, 768] suggests that the factor concerned may be pantothenic acid.

Amblyopia.—This condition had a total incidence of 14·8 per cent. The outstanding symptom was loss of visual acuity. In all cases there was a paracentral scotoma, larger for red than for black and white, with constriction of the visual fields for colour discrimination. Ophthalmoscopy revealed degenerative pigment changes round the macula in 10 per cent. of the patients, and optic atrophy in 1 per cent. Temporal pallor of the disc was present in 25 per cent. but was not considered significant, as it was also found in normal persons. There was some correlation between the incidence of amblyopia and that of "burning feet" and ariboflavinosis. The response to treatment was similar to that of "burning feet". Vitamin B_1 and nicotinic acid were ineffective, but 14 out of 15 patients improved with multivitamin capsules containing in addition riboflavin, pyridoxin, and pantothenic acid. Ground-nuts, beans, rice-polishings, and yeast also had some beneficial effect. All these substances are good sources of the B vitamins; the author considers, however, that the possibility of an essential amino-acid deficiency must also be borne in mind.

J. C. Waterlow.

GRAVES, P. R. **Pellagrous Encephalopathy.** *Brit. Med. J.* 1947, Feb. 15, 253–6.

During the last year a number of reports have recorded, among released prisoners of war from the Far East, a condition of spastic paraplegia as the end-result of an illness apparently attributable to vitamin B complex deficiency.

In the present paper, Graves gives the first published account of the original illness in these cases. He describes 63 cases of a clearly defined syndrome which came to be known among camp Medical Officers as the "spastic syndrome" and which varied in severity from a condition of deep and fatal coma to a chance-discovered extensor plantar response. Similarly the ultimate state of the patients varied from complete recovery to a paralysis so severe as to render some patients bedridden.

The outstanding and constant finding was evidence of pyramidal involvement, usually affecting the lower limbs. There were absent abdominal, and exaggerated tendon reflexes, spastic weakness in most cases, clonus, and an extensor plantar

response. Dimness of vision and mental changes each occurred in about half the cases: the former was never severe, recovered rapidly and was apparently quite different in nature from the nutritional amblyopia, with scotoma, which was also prevalent in the camp. The main mental changes were general dulling and slowness with loss of emotional control. Muco-cutaneous lesions attributable to ariboflavinosis were present in about one-third of cases and a similar proportion had suffered from painful feet syndrome.

The course of the illness appeared to be uninfluenced by the treatment available, which was very limited but which included vitamin B_1 and nicotinamide.

There were six fatal cases and in the four of these upon whom necropsy was performed there were found macroscopically small, translucent areas, 2–3 mm. in diameter, in the white matter of the cerebral hemispheres. No changes in the cord or meninges were apparent to the naked eye: microscopical investigations were impossible.

The association of the other known B complex deficiency lesions, both in individual cases and in general incidence rates, leads to the conclusion that this "spastic syndrome" is a manifestation of deficiency in some member or members of the B complex.

[This thorough and detailed description is a valuable contribution to knowledge of the neurological effects of malnutrition. The name given to the syndrome described is open to dispute and may give rise to confusion. CLECKLEY, SYDENSTRICKER and GEESLIN (this *Bulletin*, 1940, v. 37, 442) and JOLLIFFE and his associates (*J. Amer. Med. Ass.*, 1940, v. 114, 307) described an encephalopathy characterized by cogwheel rigidity, athetoid movements and uncontrollable sucking and grasping reflexes and dramatically curable by nicotinic acid. This, evidently an entirely different condition from that described by Graves, was called "nicotinic-acid-deficiency-encephalopathy" by Joliffe. But although Graves uses the term *Pellagra* to include the entire B complex deficiency syndrome, the word is quite commonly used as synonymous with *Nicotinic-acid Deficiency*, and if the name "Pellagrous Encephalopathy" is adopted for the spastic deficiency syndrome seen in P.O.W. camps in the Far East, there must inevitably be confusion with the encephalopathy named by Joliffe, until *Pellagra* is precisely defined.

In considering the aetiology of the "spastic syndrome", its similarity to some, at least, of the numerous neurological syndromes included under the name of Lathyrism, *e.g.* that described by MINCHIN (this *Bulletin*, 1940, v. 37, 677), is worthy of consideration.] *Dean A. Smith.*

RASKAN, S. B. **The Production of Experimental Pellagra by Adenine.** *Science.* 1947, Jan. 31, 126–7.

A preliminary report.

PHILLIPS, H. A. **Genito-Urinary Disorders occurring in Singapore Prisoner-of-War Camp, with special reference to Polyuria and Non-Specific Inflammations.** *Med. J. Australia.* 1946, July 27, v. 2, No. 4, 111–13.

Among some 2,000 or 3,000 prisoners of war at Singapore confined for 3½ years, diurnal and nocturnal polyuria was continuous from the commencement of the enforced Asiatic diet to the resumption of a European diet. The large volume of water absorbed by cooked rice, the small amount of protein in the diet, and possibly a diuretic principle in rice are suggested causes. Low-grade inflammation of the genito-urinary tract was common, especially chronic non-specific epididymitis which developed insidiously as a non-tender nodule, generally in the upper pole; involvement of the testis also occurred in the grossly debilitated

patients; the conditions appeared to be due to a low-grade staphylococcal infection reaching the epididymis *via* lymphatics from the prostate or bladder, the organism originally gaining ingress to the blood stream from infective skin lesions. Non-specific prostatitis also occurred. Pyelitis, cystitis and posterior urethritis were relatively common, staphylococci and colon bacilli being found in urinary smears. Sulphapyridine generally cleared up these infections rapidly; rest in bed with free fluids was insufficient. Recurrences were common. The frequency with which epithelial cells were found in the urine suggested that the urinary epithelium was not normal, and the absence of Vitamin A may have been a factor in this. Renal colic without detectable calculus was common despite the prevailing polyuria. Circumcision was frequently necessary in cases of scabies, tinea, and dermatitis, to relieve paraphimosis or to cure the otherwise intractable local condition. The involuntary escape of a small quantity of urine after otherwise normal micturition occasionally occurred and was thought to be due to atonicity of the sphincter. *F. Murgatroyd.*

Hibbs, R. E. **Gynecomastia associated with Vitamin Deficiency Disease.** *Amer. J. Med. Sci.* 1947, Feb., v. 213, No. 2, 176–7.

The condition appeared in 10 per cent. of 5,000 underfed U.S. prisoners of war in the Philippines.

SPRUE.

Suárez, R. M., Welch, A. D., Heinle, R. W., Suárez, R. M., Jr. & Nelson, E. M. **Effectiveness of Conjugated Forms of Folic Acid in the Treatment of Tropical Sprue.** *J. Lab. & Clin. Med.* 1946, Dec., v. 31, No. 12, 1294–304. [11 refs.]

Folic acid occurs naturally as the full vitamin and also in the form of various complexes or conjugates. Two of these, both polyglutamates, have been isolated in pure form, one from yeast, the other from a filtrate obtained from an aërobic fermentation of a diphtheroid organism. The folic acid complex of yeast has been identified as pteroylhexaglutamylglutamic acid. Fermentation folic acid is known to be a triglutamate (pteroyldiglutamylglutamic acid).

Fermentation folic acid appears to be utilized effectively by *Lactobacillus casei*, but for *Streptococcus faecalis* the compound has only about one-fiftieth the activity of pteroylglutamic acid. In those animals known to require folic acid (monkey, chick, rat), each of the conjugates exerts an effect equivalent to its folic acid content.

The effectiveness of folic acid in the treatment of pernicious and other forms of macrocytic anaemia has led to the investigation of these complexes as examples of the types of compounds from which human beings most probably derive a considerable portion of their supply of folic acid.

It has been suggested that the folic acid deficiency characteristic of pernicious anaemia might be due, at least in part, to the inability of such patients to obtain adequate amounts of the free vitamin from the naturally occurring complexes found in the diet and that this biochemical defect results in a deficiency of the free folic acid necessary for the maintenance of normal haematopoiesis. The parenteral administration of fermentation folic acid, in a dose equivalent to 3·1 mgm. of pteroylglutamic acid daily, caused improvement, in a patient previously treated with liver extracts, in both clinical and haematological manifestations. By complicated urinary studies it was shown that the patient excreted, prior to treatment, amounts of free vitamin, significantly lower than

those in normal subjects or in pernicious anaemia patients; but the administration of the conjugate caused the elimination of free folic acid in quantities indicating that a large proportion was converted *in vivo* to the free vitamin. When purified liver extract, free from folic acid, was administered, in addition to fermentation folic acid, a remarkable increase of excretion of free folic acid occurred. Again, administration of a concentrate of pteroylhexaglutamylglutamic acid of yeast, in daily doses equivalent to 8·4 mgm. of free folic acid, caused an equally striking improvement in a patient with sprue who had received no previous treatment. The reticulocyte response was maximal. Whether the small amounts of the free vitamin indicate the utilization of the conjugate as such, or whether they suggest a marked retention of free folic acid released from the conjugate, cannot be determined. Following the administration of purified liver extract, in addition to the conjugated vitamin, the daily urinary elimination of folic acid was increased. These findings suggest that augmentation of the urinary elimination of free folic acid has resulted from an effect of purified liver extract on the metabolism of this naturally occurring complex of folic acid.

P. Manson-Bahr.

DARBY, W. J., KASER, Margaret M. & JONES, E. **The Influence of Pteroylglutamic Acid (a Member of the Vitamin M Group) on the Absorption of Vitamin A and Carotene by Patients with Sprue.** *J. Nutrition.* 1947, Feb. 10, v. 33, No. 2, 243–50, 1 fig. [26 refs.]

"Serum carotene and vitamin A levels in 4 cases of sprue treated with pteroylglutamic acid (PGA) are reported. It was found that the low serum carotene levels observed in relapse were gradually increased following therapy. The carotene returned to its previous low level during the relapse of one patient following withholding of PGA, and again rose after a second period of therapy with PGA. . . .

"It is suggested that the M group of vitamins plays an important role in the normal physiology of the gastrointestinal tract."

HAEMATOLOGY.

MATILLA, V., COVALEDA, J. & APARICIO GARRIDO, J. El mielograma de los indigenas de la Guinea Española. [**Myelograms in the Natives of Spanish Guinea.**] *Med. Colonial.* Madrid. 1947, Jan. 1, v. 9, No. 1, 3–10.

DISCOMBE, G. & WATKINSON, G. **Atypical Anemia, with Spherocytes and Target Cells coëxisting in the Blood.** *Amer. J. Med. Sci.* 1947, Feb., v. 213, No. 2, 153–9, 5 figs. [22 refs.]

CARTWRIGHT, G. E. & WINTROBE, M. M. **Hematologic Survey of Repatriated American Military Personnel.** *J. Lab. & Clin. Med.* 1946, Aug., v. 31, No. 8, 886–99, 7 figs. [13 refs.]

A haematological survey was made of 75 repatriated American prisoners of war who had been in Japanese hands for an average of 40·1 months. Their diet had consisted mostly of rice in amounts varying from 300–700 gm. per man per day. Sometimes barley, corn or soya beans were mixed with the rice; when soya beans were consumed, pellagra did not appear prevalent. The only meat consisted of about 50–100 gm. once or at the most twice a month. Vegetables were served very infrequently and fresh fruit was not seen. Men resorted to eating snakes, rats, cats, dogs, lizards, frogs and any insects that

could be obtained. Red Cross packages were rarely distributed. The nutritional deficiency was shown by the history of cheilosis, glossitis, stomatitis, dermatitis, and diarrhoea in 50 to 70 per cent. of the men. A history of wet beriberi was obtained in 77 per cent. and of dry beriberi in 50 per cent. of them. A mild (haemoglobin 11–14 gm. per 100 cc. blood) or moderate (haemoglobin 8–11 gm. per 100 cc. blood) anaemia was observed in 52 per cent. of the men but it rapidly improved under adequate treatment. A history of malaria was obtained in 76 per cent. of the patients and intestinal parasites were demonstrated in about 75 per cent. In the 75 persons studied in detail, the anaemia was macrocytic in 73 per cent., normocytic in 23 per cent. and microcytic in 4 per cent. A mild reticulocytosis and leucocytosis were frequently encountered; eosinophilia was common. Blood films showed numerous macrocytes and anisocytosis, polychromatophilia, and an occasional nucleated red cell; about half the patients had low serum iron and copper values. It was thought that most of the men examined were in the recovery phase of severe nutritional macrocytic anaemia. *F. Murgatroyd.*

Spies, T. D. **The Activity of another *L. casei* Factor in Macrocytic Anemia.** *Southern Med. J.* 1946, Aug., v. 39, No. 8, 634–5.

Another *Lactobacillus casei* factor, obtained from a fermentation residue and almost as active as liver *L. casei* factor when assayed with *L. casei* but only 6 per cent. as active when assayed with *Streptococcus faecalis* R. was tested on a patient with macrocytic anaemia in relapse. He was given 3 mgm. daily by intramuscular injection for 11 days. The reticulocytes rose from 1 per cent. to 2·6 per cent. on the fifth day, reached a peak of 5·4 per cent. on the tenth day and subsided slowly to 2·6 per cent. by the sixteenth day. By this time the erythrocytes had risen from 1·89 to 2·4 million and the haemoglobin had increased from 10·2 to 10·5 gm. Bone marrow studies confirmed the response and subjectively the patient felt improved, his tongue stopped burning and his appetite was better. The blood response was submaximal but only small quantities of the factor were available for trial. *F. Murgatroyd.*

Patel, J. C. **Crude and Refined Liver Extract in Nutritional Macrocytic Anaemia.** *Indian Med. Gaz.* 1946, Nov., v. 81, No. 11, 452–4. [13 refs.]

Gendel, B. R. **Folic Acid in the Treatment of Aplastic Anemia.** *J. Lab. & Clin. Med.* 1947, Feb., v. 32, No. 2, 139–46, 3 figs. [13 refs.]

Three patients treated showed remissions of varying degree. The specific action of the folic acid is not conclusively proved in these cases.

Henderson, A. B. & Thornell, H. E. **Observations on the Effect of Lowered Oxygen Tension on Sicklemia and Sickle Cell Anemia among Military Flying Personnel.** *J. Lab. & Clin. Med.* 1946, July, v. 31, No. 7, 769–76, 1 fig. [13 refs.]

As diminished oxygen tension induces sickling in those with sicklaemia, and as the incidence of sicklaemia averages between 7 and 9 per cent. in negroes in the United States of America, experiments were made to assess the suitability of negro aviators for high altitude flying. Among 260 negro candidates in various stages of training and 52 combat returnees, examined by the wet preparation method, 23 showed sickling, the incidence of the trait being therefore 7·37 per cent. None of the 23 affected men presented any other signs of disease, and they were then tested in a decompression chamber under lowered oxygen tension near the level of human intolerance, but none showed any

evidence of immediate intravascular sickling or increased erythrocyte haemolysis. Their physical responses to lowered oxygen tension were not remarkable and they varied as did control subjects. A volunteer with active sickle cell anaemia, with a haemoglobin of 50 per cent. and an erythrocyte count of 3·2 million per cmm. with 8 per cent. of cells sickled, was then subjected to conditions simulating altitudes up to 16,000 feet without oxygen for five minutes. There was gradual increase in sickling proportional to the lowering of oxygen tension but apparently a compensatory mechanism resulted in an increase in erythrocytes which sufficed for his oxygen needs. In fact he was able to respond even better to the diminished oxygen tension than did control subjects or those with sicklaemia. Administration of oxygen for a short period resulted in more normal erythrocytes. The experiments suggested that adequate administration of oxygen protected patients against sickle cell anaemia, and that even without oxygen therapy no massive erythrocyte destruction occurred in the aviators with sicklaemia who were otherwise fit. *F. Murgatroyd.*

DERMATOLOGY AND FUNGUS DISEASES.

Neves, J. A. & Costa, O. G. **Tinea Nigra.** *Arch. Dermat. & Syph.* 1947, Jan., v. 55, No. 1, 67–84, 6 figs. [Refs. in footnotes.]

A discussion of the condition, with a report of the first case recorded from Minas Geraes, Brazil.

Saglam, T. **Histoplasmosis.** *Schweiz. med. Woch.* 1946, Nov. 9, v. 76, No. 45, 1153–6, 5 figs. [11 refs.]

The case described is that of a man 38 years of age in Turkey who for a period of three years suffered from repeated rigors and fever. There was general glandular enlargement associated with spleno- and hepato-megaly. No satisfactory diagnosis was made till the organism *Histoplasma capsulatum* was seen in stained films of spleen puncture material. After death, the same organism was seen in necrotic areas in fragments of the spleen and liver, the only tissues it was possible to obtain for post-mortem examination. Attempts at culture and the infection of animals failed. *C. M. Wenyon.*

Mider, G. B., Smith, F. D. & Bray, W. E., Jr. **Systemic Infection with *Cryptococcus neoformans* (*Torula histolytica*) and *Histoplasma capsulatum* in the same Patient.** *Arch. Pathology.* 1947, Jan., v. 43, No. 1, 102–10, 12 figs.

" A negro boy died approximately three months after the onset of a subacute febrile illness. C. neoformans (T. histolytica) and H. capsulatum were grown from the blood and from exudate. Lesions produced by each of these fungi were found at autopsy."

da Fonseca, O., Jr. Granulomatoses blastomycoïdes bénignes. [**Benign Blastomycoides Granulomata.**] *Bull. Acad. Méd.* 1946, v. 130, Nos. 39/40, 719–21.

da Fonseca distinguishes a benign form of mycotic skin granuloma, caused by dimorphic fungi, which he calls granulomatosis blastomycoides benigna, and he describes two cases of this granuloma in Brazil, caused by two new fungi. The first type, caused by *Glenosporella loboi* da Fonseca & Aréa Leão 1940, took the form of keloid-like or xanthoma-like lesions on the lumbar region, consisting

of cutaneous or subcutaneous nodules measuring up to 3 cm. in diameter, sessile or pedunculated and of a reddish-violet colour. There was no inflammation or glandular enlargement. Histologically, the granuloma was seen to be composed mainly of histiocytes in and amongst which the parasite was seen as hyaline, thick-walled cells, rounded and measuring 6 to 11 μ in diameter or oval and measuring 10 to 14 μ by 8 to 9 μ, isolated, in pairs or in little groups. The overlying epidermis was thinned and stretched out with resulting disappearance of the papillary pegs. In culture, the fungus formed white, duvetted colonies, 1 to 1·5 cm. in diameter, consisting of hyaline, septate, ramifying hyphae, rarely breaking into chains of cylindrical or ellipsoidal arthrospores, and bearing numerous aleuries, hyaline, spherical or ellipsoidal, with thick walls, measuring 3·5 to 10 μ long by 1·8 to 8·0 μ wide in greatest diameter. There were also intercalary chlamydospores.

In the second case, caused by *Glenosporopsis amazonica* da Fonseca 1943, the initial lesions appeared as little flat elements 2 to 3 mm. in diameter, suggesting the apple-jelly nodules of lupus. As the lesion increased in size, it was seen to be composed of little papules and, later, cutaneous nodules measuring from a few mm. to 1·5 cm. in diameter. These nodules were adherent to the skin but mobile on the deeper tissues. They were isolated or confluent, forming groups with polycyclic outlines. There were also subcutaneous nodules a few mm. in diameter, not adherent to the skin. These subcutaneous nodules were rounded and hard and the overlying skin was not affected. The histopathology showed thickening of the horny layer and thinning of the rete Malpighi. There was little or no inflammatory reaction but there were numerous giant cells of the Langhans type. In the giant cells and also free in the tissue were numerous parasites in the form of rounded cells, hyaline and thick-walled, isolated or grouped in chains of 3 to 6 cells or in irregular clumps. (The measurements of this parasite are not stated.) There was neither caseation nor necrosis. The colonies in culture are whitish, greyish or brownish and duvetted, reaching a diameter of 3·5 cm. They are formed of a filamentous mycelium, septate and branching, at first hyaline, then, in part at least, brownish. There is a limited number of aleuries, the hyaline form, when spherical, measuring 4 to 13 μ in diameter, and when oval 6 to 19μ long by 3·5 to 12 μ broad. There are also small, pigmented aleuries which rarely exceed 7 μ in diameter.

J. T. Duncan.

TROPICAL OPHTHALMOLOGY.

A Review of Recent Articles. XLVIII*.

Malnutrition.—The ocular disturbances associated with malnutrition are reviewed by Shapland[1]. He quotes the ophthalmic report by Claffy, who was himself a prisoner of war in the Far East and in charge of the ophthalmic wards at Changi and Kranji Hospitals. Claffy described the ocular disturbances under three headings: (1) Retrobulbar neuritis; (2) Corneal degeneration and ulceration; (3) Partial ophthalmoplegias. The first two he ascribed to a deficiency in the B_2 complex and the third to a simple thiamine lack.

The corneal condition was characterized by minute, superficial, punctate, greyish opacities usually staining with fluorescein and up to 0·2 mm. in diameter,

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* For the 47th of this Series see Vol. 43, pp. 1170–1182.

[1] Shapland, C. D. Ocular Disturbances associated with Malnutrition. *J. Roy. Army Med. Corps.* 1946, Dec., v. 87, No. 6, 253–65.

occurring in one or both eyes, more commonly bilateral and only visible with a lens and good illumination. In mild cases the spots were few, whilst in severe cases the whole of the cornea was involved. In some cases the spots coalesced to form larger patches up to 3 mm. in diameter, or in other cases were arranged in fine horizontal striae or in multiple branched patterns. Occasionally deep striae were visible. These changes occurred most commonly in the intermarginal area. The corneal nerves were unduly prominent, but vascularization of the cornea was never observed in uncomplicated cases. The symptoms were slight blurring of vision, irritability of the eyes in sunlight, slight grittiness of the lids and lachrymation. Frequently there were no symptoms and the condition was only found on examination. The incidence was closely linked with a co-existent retrobulbar neuritis and other manifestations of B_2 deficiency and most of the cases responded to this form of treatment; it was found possible in all uncomplicated cases of the corneal condition to prevent the occurrence of the more serious nerve lesion. The characteristic corneal changes of ariboflavinosis described by various writers were not observed, night blindness was relatively rare, and the conjunctival changes of vitamin A deficiency were not seen. The condition is essentially due to a degeneration of the corneal epithelium, rarely extending deeper into Bowman's membrane and is apparently not inflammatory, as conjunctival and ciliary injections are infrequent.

Actual ulceration of the cornea, although rare, did occur in some cases, but after the introduction of red palm oil into the dietary the incidence of this complication dropped to nil.

The optic nerve lesion, Claffy considers to be a chronic form of bilateral retrobulbar neuritis with a characteristic syndrome due to a diet deficient in vitamin B_2 complex; it is characterized clinically by loss of central vision due to involvement of the papillo-macular bundle; the peripheral vision is not affected. He considers that the aetiology of the disease is related to an endogenous toxaemia produced by the ingestion of an ill-balanced excessive carbohydrate diet lacking sufficient vitamin B_2 complex through faulty metabolism; this elaborates an endogenous neurotoxin which has a special affinity for either the ganglion cells of the macula or the axis cylinders in the papillo-macular bundle or both, and possibly the nerve fibres of the ophthalmic division of the trigeminal supplying the cornea, so causing the characteristic lesion there. The sub-chiasmal part of the visual pathway is therefore alone affected and the effects are usually bilateral; one eye may, however, be affected first and early treatment may prevent the second eye from becoming involved. The degree of impairment of vision varies from 6/5 to counting fingers at less than one metre and depends upon the concentration of the toxin in the blood; this concentration is regulated by the patient's natural resistance to it. Mild cases were seen in which, without any form of treatment, a stabilized condition was reached with very little resulting impairment of vision, possibly because of the auto-synthesis of the missing essential vitamin factor. This was an important point to bear in mind, especially in assessing the results of various forms of treatment.

Claffy stresses that the first change in the optic nerve is failure of conduction of nervous impulses without destruction of nerve tissue, and hence complete recovery of visual function is possible at this stage; but if the toxin is sufficiently concentrated and allowed to act for sufficient time, degeneration of nerve tissue takes place, with resulting permanent visual loss. Hence the importance of early treatment.

The disease affected all ranks irrespective of age or occupation; it affected equally those working in or out of the sun. Excessive rice consumption appeared to be the most important predisposing cause, when associated with

insufficient vitamin B_2 complex to metabolize it. It is definitely not a disease associated with starvation and it was conclusively proved that in those who suffered semi-starvation the incidence of ocular deficiency disease was very low and in others when the rice ration was halved the incidence dropped practically to nil.

Intercurrent disease played an important part. The incidence following dysentery was high, the cases were of sudden onset, usually of severe degree, more resistant to treatment, and a relatively large number progressed to partial optic atrophy. Dengue fever and diphtheria were of much less significance, and recurrent malaria had apparently no ill-effect. Tobacco played no part in the causation of the disease and smokers responded to treatment even when they continued to smoke. Excessive muscular effort was a contributory factor, especially in those unaccustomed to it. A person could remain in a state of subclinical deficiency over a long period at a low basal metabolic level, but this delicate balance was easily upset by extra manual work or intercurrent disease.

Loss of weight, " eye strain ", and focal sepsis played no part in the aetiology of the disease. Many cases of retrobulbar neuritis showed no other manifestation of deficiency disease, but on the other hand many did so. The most important of these were :—*Painful feet.* At the height of the epidemic period 75 per cent. of cases were affected, but this fell later to 2 per cent. *Corneal degeneration.* The percentage varied from 66 to 15 per cent. *Stomatitis and Glossitis.* The percentage varied from 30 to 80 per cent. *Scrotal dermatitis.* Up to 80 per cent. were affected. About 1 per cent. were associated with nerve deafness, and of 8 cases of spastic paralysis, only one showed evidence of retrobulbar neuritis. During an epidemic of pellagra none of the patients showed evidence of retrobulbar neuritis or of degeneration of the cornea, the only ocular finding being a mild conjunctivitis. Very few cases of beriberi were associated with retrobulbar neuritis even during the epidemic period and this was most probably due to the general prophylactic issue of rice polishings given at the time, but these had no effect in controlling the incidence of the ocular disease.

[From Claffy's findings it would appear that Manson's observations were correct, as he stated that the condition brought about by a deficiency disease merely predisposes to, or facilitates the operation of, something else, perhaps an unknown germ, which, but for this deficiency, would remain inoperative, even if introduced.]

The important symptom in uncomplicated cases was blurring of vision, one eye often being affected first ; the onset might be sudden or gradual. Difficulty in reading was caused through the print becoming hazy and letters tending partially to disappear. Other symptoms were headache, aching and pains behind the eyes, and irritability in the sun.

Impairment of vision was of all degrees from 6/5 in mild cases to counting fingers at less than a metre in severe cases. In most cases, the fundi appeared normal. In 1 per cent. of cases, a mild papillitis was present. Retinal haemorrhages were present in 1·5 per cent. and were situated in the superficial layers of the retina near the disc margin ; they varied considerably in size. Temporal pallor of the discs occurred, but was an unreliable sign and gave no indication of the degree of visual loss except in a few of the worst degrees of visual failure, when there was marked pallor of the whole disc together with narrowing of the retinal blood vessels. Scotomata were almost always demonstrable. They were usually absolute, central or paracentral in position, although centro-caecal or annular examples also occurred. The size varied from minute " flicker " to 1/1,000 red and green up to large central scotomata to 20/1,000 white. There was no disproportion between white and colours. Peripheral fields of vision usually remained intact. With treatment it was possible to stop the progress of the disease. The prognosis was excellent in early cases,

but very unfavourable in those giving a history of more than two months without treatment. Of some 1,300 cases treated 95·5 per cent. showed improvement, 4 per cent. remained stationary, and less than 0·5 per cent. retrogressed.

Patients received marmite, the most concentrated form of vitamin B_2 available, but supplies were always limited and occasionally failed. Rice polishings, *kachang hijou*, soya bean, nicotinic acid, extra protein, red palm oil, green leaf and grass extract, local greens, "Changemite", yeast, riboflavin and multi-vitamin tablets were all employed at times. Cases treated with rice polishings showed steady retrogression, although these did control the thiamin deficiency diseases. Sporadic cases of partial ophthalmoplegias occurred. These were manifested by progressive difficulty in keeping the eyes open during the day (which was worse at night) and diplopia. Bilateral ptosis and paresis of the third and sixth cranial nerves were noted, associated with paresis of the accessory and cervical nerves with consequent difficulty in holding the head up. All these cases responded well to large doses of thiamin chloride.

In 1945–46, observations of 975 repatriated prisoners of war from the Far East were made by Shapland himself. Of this number, 777 showed pure refractive errors with no physical signs of organic disease in either eye apart from squint; 60 were examples of a serious past retrobulbar neuritis with corrected vision of 6/18 right and left or less. Forty-four had a past retrobulbar neuritis with corrected vision of all degrees from 6/5 to 6/18 but still showing central field defects; 45 had a history of visual disturbance during captivity, showed temporal pallor of the discs but normal vision and no scotomata; and 49 showed other ophthalmic diseases.

The author points out that in these 975 cases, only 5 spontaneously complained of night blindness and not one of them showed any evidence of a nutritional optic neuropathy; a point worthy of note is that not a single case of trachoma was found in this series of men returning from diverse parts of the Far East.

The ocular symptoms in prisoners of war in Sumatra are discussed by Reed[2]. His conclusions are based on the 126 patients who complained of ocular disorders amongst 490 British servicemen who were prisoners of war in Sumatra. The majority complained of a syndrome characterized by photophobia and blurred vision, both in reading and for distant objects. There was also usually pain and injection of the cornea and watering of the eyes in the early stages. The onset was as a rule fairly gradual, the visual defect taking weeks or months to develop fully.

The syndrome was accompanied in many cases by nerve and skin signs indicative of malnutrition, but it occurred apart from beriberi or pellagra.

The cause of the condition lies between a toxin, an infection, and a dietary deficiency, or, as seems not improbable, a combination of these factors. The author is of opinion that his cases were probably examples of hypo-riboflavinosis with a possible added infective factor, the lesion being a retrobulbar neuritis.

Vitamins in Ocular Disease.—The treatment and prevention of some ocular diseases by vitamins and vitamin therapy in eye diseases are discussed by Kotby[3] and Attiah[4] respectively. Vitamin A serves both in tissue building and for the defensive integrity of the epithelial structures of the body. It is also essential for the synthesis of the visual purple in the retina. Its main use in the eye is for xerophthalmia, chronic blepharitis, phlyctenular disease, night blindness, and asthenopia, when about 30,000 I.U. should be given daily.

[2] Reed, J. G. Ocular Symptoms in Prisoners of War in Sumatra. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1947, Mar., v. 40, No. 4, 411–20. [28 refs.]

[3] Kotby, A. The Treatment and Prevention of some Ocular Diseases by Vitamins. *Bull. Ophthalm. Soc. Egypt.* 1940, v. 33, 138–49.

[4] Attiah, M. A. H. Vitamin Therapy in Eye Diseases. *Bull. Ophthalm. Soc. Egypt.* 1940, v. 33, 106–37. [61 refs.]

Locally in the form of 10–50 per cent. cod liver oil ointment it is valuable in all corneal epithelial diseases and injuries. In early cases of retinitis pigmentosa it can be given with advantage.

Vitamin B_1 is used in the eye for building resistance to corneal ulcers in elderly people, in toxic amblyopia, obscure cases of optic neuritis and ocular neuralgias. It can be given in the form of injection up to 2,000 I.U. daily. For corneal conditions, it is used as a 2 per cent. ointment which may be combined with Vitamin A. Vitamin B_2 is essential for normal tissue metabolism and its deficiency is held to be concerned with the formation of cataract. The human requirements of Vitamin C are 1,000–2,000 I.U., and its rôle in the eye is for the lens metabolism ; it has also been given as a preventive of cataract, for various intraocular haemorrhages and for healthy healing after operations.

The human requirements of vitamin D range between 1,000 to 5,000 I.U. and should be supplemented with calcium and phosphorus. Deficiency in vitamin D may lead to lamellar cataract. It is used for the prevention of the onset of myopia or arrest of progressive myopia, in obscure ocular haemorrhages, vernal catarrh, and phlyctenular conjunctivitis.

Combined vitamin therapy in surgical conditions, before and after intraocular operations, helps in the prevention of haemorrhages, infection and other complications.

Conjunctivitis.—The incubation period of epidemic kerato-conjunctivitis in Bengal is discussed by THORNE[5]. His observations are made on an outbreak of 17 cases seen in the Calcutta area in September 1945. The patients were airmen who had been playing football on muddy grounds. Eight patients came from one unit, 7 of whom played football on a very waterlogged ground on the same day. The virus of epidemic kerato-conjunctivitis is thought to be present in the soil and to be transferred readily to the eyes of footballers playing on muddy grounds. The date of infection and the onset of symptoms could be accurately determined and thus the incubation period was found to be between twelve and seventeen days. The period is longer than that suggested by writers on epidemics in other countries, who put it at four to five days.

A review of 28 cases of phlyctenular conjunctivitis is made by MIRVISH and HILSON[6]. In their findings, the ratio of females to males affected was 3 : 1. With one exception, all the patients had associated tuberculosis, either of the lung or of the cervical or abdominal glands. Of the 23 patients showing radiological evidence of tuberculosis, 17 showed active lesions. This high proportion of active lesions is of great clinical significance, as pulmonary tuberculosis, even of the active type, can easily be overlooked if reliance is placed on physical signs in the chest alone. Apart from tuberculosis, tonsillar affection was the commonest accompanying lesion.

The authors' findings suggest that phlyctenular conjunctivitis or keratitis in non-European children is far from a mild disturbance, and in every case a careful search for tuberculous foci should be made and appropriate treatment instituted.

Trachoma.—The incidence of trachoma in the Southern Highlands Province of Tanganyika is discussed by REED[7] who records the results of a brief survey which was carried out during 1945. Most of the work was done in Iringa, but he was also able to examine the children in a few schools in Chunya, Tukuyu and Mbeya districts. In his series, 3,177 adults and children were examined

[5] THORNE, B. T. Epidemic Kerato-Conjunctivitis in Bengal. The Incubation Period. *Lancet.* 1946, Nov. 16, 715.

[6] MIRVISH, I. & HILSON, D. Phlyctenular Conjunctivitis. A Clinical and Radiological Study of 28 Cases. *Clin. Proc.* Cape Town. 1946, Nov., v. 5, No. 9, 388–93.

[7] REED, H. The Incidence of Trachoma in the Southern Highlands Province of Tanganyika. *Brit. J. Ophthalm.* 1946, Oct., v. 30, No. 10, 573–80, 1 map.

and 1,710, or 53·8 per cent., were found to be infected. All these Africans were members of the various Bantu tribes living in the Southern Highlands Province. These figures show that the disease is very common, but it is mild in type, and frequently so mild as to give rise to no symptoms of discomfort. This comparative lack of symptoms probably explains why the disease has been considered rare amongst Africans. Of the 3,177 examined, only 442, or 13·9 per cent., were in any real danger of developing incapacitating complications. The incidence rate varies considerably from 13·7 per cent. in the Rungwe district to 87·3 per cent. in the neighbourhood of Kalenga. It would appear that diet, dust, the personal habits of cleanliness and the occupation of cattle-raising and the associated swarms of flies are factors affecting the incidence rate. Climate, however, does not of itself appear to have much effect upon the incidence of trachoma in the Province.

Penicillin in Ophthalmology.—Pure penicillin in ophthalmology is discussed by SORSBY and UNGAR[8] and also in a leading article in the same journal. Until recent months, commercial penicillin has been in current use ; instilled locally into the conjunctival sac in high concentrations it is not well tolerated. There are discomfort, conjunctival hyperaemia, and, in extreme cases, damage to the corneal epithelium. With tolerated concentrations, there is no penetration through the cornea into the interior of the eye. To overcome the obstacles to the passage of the drug into the interior of the eye, it has been given in the form of subconjunctival and intravitreal injections and iontophoresis of solution instilled into the conjunctival sac has been used, but with indifferent results.

In contrast, pure penicillin is remarkably well tolerated by the eye, and dosage need no longer be limited by the intolerance of the eye to the impure supplies available till recently. Local applications containing up to 100,000 units per ml. or per gramme in watery solutions and in ointments can be used. Repeated subconjunctival injections of 50,000 units in 0·5 ml. of water are well tolerated and intravitreal injection, though not free from secondary effects, is also well tolerated. It is now clear that local applications in high concentration instilled into the conjunctival sac allow adequate penetration into the anterior chamber of the eye, and experimental infections of the anterior chamber have been readily controlled. This applies still more to subconjunctival injections, so that the current teaching that adequate therapeutic levels cannot be obtained in the interior of the eye is no longer valid. It is also clear that adequate though more evanescent levels of penicillin can be obtained by massive systemic administration. Infections of the vitreous are, however, only partially controlled by the local applications of drops, ointments and systemic administration, and the only satisfactory method of treatment appears to be by subconjunctival injections.

The clinical use of penicillin in intraocular infections still requires clarification. The range of efficacy of ointments for intraocular infections has still to be established, as has the frequency of application. Likewise, clinical trial will have to establish the best way of giving massive doses of penicillin systemically. In intraocular infections, involvement of the vitreous is always a serious complication ; even a low-grade infection has a grave prognosis.

The authors' researches bring out forcibly three essential points ; the need for early treatment ; the continuation of treatment for at least 24 hours and possibly 72 hours after the eye is apparently normal ; the fact that, in anterior chamber infections, evacuation and irrigation at an early stage in addition to subconjunctival injections may prove advisable.

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[8] SORSBY, A. & UNGAR, J. Pure Penicillin in Ophthalmology. *Brit. Med. J.* 1946, Nov. 16, 723–31, 3 charts. [10 refs.]
BRITISH MED. J. 1946, Nov. 16, 740–41. [11 refs.] Penicillin in Intraocular Infections.

It would appear that the adequate use of pure penicillin for intraocular infections promises control of a hitherto uncontrollable condition, but the optimum modes of use have still to be established. At present, subconjunctival injections of 50,000 units at 6-hourly intervals are recommended ; and in the case of vitreous infections it may be necessary to combine subconjunctival with massive systemic injections and possibly even to employ direct injection of pure penicillin into the vitreous.

Ocular Complications of Relapsing Fever.—The ocular complications of African tick or relapsing fever are discussed by GARCIN.[9] His observations are based on 7 cases which he treated at Dakar in the two years 1944–45. All these complications occurred in Africans and no ocular complications were seen in European patients. The probable explanation of this is that the uveal tract is more vulnerable in the case of the African, as his resistance has been lowered by other accompanying infections including syphilis, which is very common in French West Africa. In addition, Africans usually present themselves much later for treatment than Europeans. Ocular complications occur late in the disease (between the 4th and 10th weeks) and the commonest are iritis and affections of the vitreous ; they are caused by infection through the blood stream and are independent of meningeal complications. Involvement of the vitreous is perhaps the most common ; it may be present without any apparent inflammation of the iris and may only manifest itself by impairment of vision without any external evidence of inflammation. The vitreous becomes cloudy, obscuring all fundus details, but as a rule returns to normal with treatment, leaving no evidence of choroiditis.

Vision may be reduced very considerably, but provided the pupils are kept dilated with a mydriatic, the prognosis is good. Inflammation of the optic nerves is rare and dependent upon involvement of the meninges. Optic neuritis and optic atrophy do occur in relapsing fever, but they are probably due to the treatment of the disease with pentavalent arsenical preparations rather than to the spirochaete infection, much the same as occurs in the case of trypanosomiasis.

The author discusses the treatment with pentavalent arsenic and advises extreme caution with preparations of this drug if the eyes are involved, as the fundi cannot be watched. He advises repeated examination of the ocular fundi during the routine treatment of the disease with such preparations.

Occupational Ophthalmology.—Industrial ophthalmology is discussed by KUHN,[10] who points out that the term is already obsolete and the more correct one should be occupational ophthalmology. Some of the phases of this work are the following :—New visual testing techniques have been devised whereby eyes can be matched to occupational needs. A thorough knowledge of both actual work distances and mechanical details of such needs are required. Here the future use of special occupational glasses gives promise of being a contribution to visual comfort, increased production and many industrial relations problems. The collection of properly recorded visual statistics by the use of modern punch-card analytical procedures is discussed. The development of closer relations between management and the medical profession is essential. Active interest in the field of safety to eyes and the understanding of protective equipment is needed. The understanding of illumination in industry, of the use of colour in reducing visual fatigue and of what constitutes a minimum industrial eye service for either a large or a small plant should be acquired.

[9] GARCIN, G. Au sujet de quelques cas de complications oculaires de la fièvre récurrente à tiques Dakaroise. *Bull. Méd. de l'Afrique Occidentale Française.* 1946, v. 3, No. 1, 57–64. [14 refs.]

[10] KUHN, H. S. Industrial Ophthalmology as of 1946. *J. Amer. Med. Ass.* 1946, Nov. 30, v. 132, No. 13, 772–7, 4 figs.

Medical schools should incorporate both undergraduate and postgraduate courses in occupational ophthalmology. Research work is urgent in such problems as special near point complications, new chemical hazards, a better understanding of ultra-violet and infra-red hazards, and training of special staff to carry out details of industrial eye programmes. The author points out the importance of this branch of ophthalmology and the need for its further development in " the era of atomic energy ". *E. O'G. Kirwan.*

MASSOUD, F. **Egypt's Contribution during the War to Protection against Disease through Care of Eyes of Babies.** *Brit. J. Ophthalm.* 1946, Oct., v. 30, No. 10, 617–22.

TISSEUIL, J. Contribution à l'étude du trachome au Sénégal. [**A Study of Trachoma in Senegal.**] *Méd Trop.* Marseilles. 1945, v. 5, No. 3, 222–4.

Trachoma has an average incidence of 15·6 per cent. amongst the natives of Senegal. This average was determined by the author as a result of his examination of 2,816 children and 147 adults early in 1945.

Amongst these persons, there were 370 cases of follicular conjunctivitis (12·5 per cent.) and 465 of trachoma (15·6 per cent.)

Trachoma was most frequent in the poorer villages. The proportion of cases increased up to the age of 5 years and diminished thereafter. Other ocular lesions were rare. The author is convinced that the benign nature of trachoma as seen in Senegal is due to the resistance possessed by the native inhabitants. *H. J. O'D. Burke-Gaffney.*

IBRAHIM, K. G. **Bilharzial Granuloma of the Conjunctiva.** *Bull. Ophthalm. Soc. Egypt.* 1941, v. 34, 89–92.

Report of a case.

ATTIAH, M. A. H., SALEM, H. H. & EL-GAMMAL, Y. **Ocular Infection with Oesteridae in Egypt.** *Bull. Ophthalm. Soc. Egypt.* 1940, v. 33, 16–25, 1 pl. [16 refs.]

Report of 2 cases.

BALCET, C. La patologia oculare in Transgiordania. [**Ocular Pathology in Transjordan.**] *Arch. Ital. Sci. Med. Colon. e Parassit.* 1942, Oct., v. 23, No. 10, 373–82.

FEIGENBAUM, A. & LANDAU, J. **Experiences with Penicillin in Ocular Diseases.** *Harefuah.* Jerusalem. 1947, Feb. 16, v. 32, No. 4. [In Hebrew 72–4. English summary 74.]

HEAT STROKE AND ALLIED CONDITIONS.

CAPLAN, A. & LINDSAY, J. K. **An Experimental Investigation of the Effects of High Temperatures on the Efficiency of Workers in Deep Mines.** pp. 1–30, 8 figs. [12 refs.] Discussion pp. 33–46 [LINDSAY, J. K.; MCINTYRE, J. T.; KING, E. J.; TAYLOR, S. E.; PRYOR, T.; HOLLAND, T. & others].

[Paper issued Sept. 12, 1946, submitted for discussion at Meeting of Inst. Mining & Metallurgy held on Oct. 17, 1946.]

Summary of this paper appears in *Bulletin of Hygiene*, 1947, v. 22, 333.

ADOLPH, E. F. **Tolerance of Man toward Hot Atmospheres.** *Pub. Health Rep.* Wash. Suppl. No. 192. 38 pp., 28 figs. [73 refs.] [Summary appears also in *Bulletin of Hygiene*].

This report was originally prepared to delimit the climates disadvantageous in military operations. It is based on research work carried out during the recent war and on other information derived from industrial studies.

Forty years ago, HALDANE concluded that even lightly clothed persons could not withstand wet-bulb temperatures exceeding 88°F., and that continuous hard work was impracticable at wet-bulb temperatures above 78°F. More recent work indicates that higher temperatures than those recorded by HALDANE as the limiting values can be withstood. It appears that nude men while sitting can withstand a wet-bulb temperature of 94·5°F. indefinitely, while when walking the limit is 92°F. wet-bulb. For a relatively short exposure the limiting temperatures are higher.

Although these findings are quoted in terms of wet-bulb temperature some researches have shown that the limiting wet-bulb temperatures vary with change in relative humidity. With low humidities—and high dry-bulb temperatures—the limiting wet-bulb temperature is somewhat reduced. From some American studies it appears that with relative humidities varying between 15 per cent. and 100 per cent. the limiting conditions are adequately expressed in terms of the scale of effective temperature, so long as radiation is not a factor of importance. From other recent researches, however, it appears that in spite of wide changes in relative humidity the wet-bulb temperature is a better index than effective temperature. Further work appears to be necessary to clarify this point. Concerning the influence of air movement, attention is drawn to the heating effect of such movement when the temperature of the air is above that of the body surface. Movement of air faster than 400 ft. per minute has little additional effect, for, it is remarked, its cooling or heating effect varies roughly as the square root of the air velocity.

Clothing has a substantial effect. The limiting wet-bulb temperature is reduced by about 3°F. with even the lightest complete clothing. Arctic winter clothing plus an impermeable outer suit cannot be worn for four hours at rest at a wet-bulb temperature greater than 81°F., and at that temperature a man wearing a chemical-warfare suit cannot work at decontamination for more than one hour.

Over short periods of time clothing may afford to men at rest appreciable protection from heat. In the heat, one is less concerned with the insulating value of cloth than with its looseness of fit, its bellows action, and its permeability to moisture. Resistance of clothing to convection is a function of its thickness, whereas resistance to radiation depends upon colour—white or metallic surfaces are reflective.

Work shortens the time during which one can stay in a given hot atmosphere. Thus, when working at the rate of 208 kgm. per minute, one can endure a wet-bulb temperature of 100°F. only one-third as long as when at rest. Temperatures of about 90°F. become intolerable at this rate of working, while they can be tolerated indefinitely while resting.

Body size may be crucial in determining ability to work in hot environments. Those with a high ratio of surface to weight fare better in the heat.

People gain much acclimatization to heat with the first few exposures. In the course of a week's acclimatization, an increased wet-bulb tolerance of as much as 10°F. may be gained. It is suggested that acclimatization to moist heat demands more modification in circulatory functions, while acclimatization to dry heat includes the ability to produce more sweat upon the same provocation.

Acclimatization to dry heat is a partial but not a complete acclimatization to moist heat.

Among acclimatized men the variations of tolerance times are considerable. It has been considered that there are inherent racial differences. The suggestion is here made that the differences partly depend on exposure to heat in infancy, at which time the functions of sweat and peripheral circulation are most susceptible to change. There seems to be no proof of inherited difference in function. Young men of 21 to 26 years of age are the most tolerant of heat.

In hot surroundings, the water content of the body must be maintained. Shortage of water to the extent of only 2 or 3 litres renders the body heat-intolerant. Water depletion leads to dehydration exhaustion which can be quickly relieved by drinking water. Data are cited to show that the wet-bulb temperature needs to be lowered by 13°F. to compensate for a loss of body water equal to five per cent. of the body weight.

Low salt intake in those exposed to heat may cause the development of muscle cramp. It has been suggested that men adapt themselves to restricted salt intakes by forming sweat of low salt content, but the tolerance to heat may not be as good as with a high salt intake.

Many functional conditions impair the tolerance to heat. Amongst these are fevers, wounds (with haemorrhage) and fatigue. Among the aspects of heat tolerance on which further investigation is required the author mentions the effects of solar radiation upon tolerance, the effects of machine and furnace radiation, the effects of contact with hot surfaces, and the long-term effects of heat. *Thomas Bedford.*

TROPICAL ULCER.

CHARTERS, A. D. **The Aetiology of Tropical Ulcers in Somalis.** *J. Trop. Med. & Hyg.* 1947, Feb., v. 50, No. 2, 22–7.

The author has previously suggested that food deficiency, especially of calcium and vitamin A, is an important factor in the aetiology of tropical ulcer [see this *Bulletin*, 1944, v. 41, 235]. He based that opinion on observations made on Somali and other African troops during the war, and in the present paper he records further observations on Somali troops, in relation to their diet.

The staple food of Somalis in civil life is camel milk, and when this is unobtainable the milk of goats, sheep or cattle is used. Some meat is eaten, and rice is coveted but not plentifully used. The quantity of camel milk available depends on season and grazing. In the army the Somali soldiers were provided with a liberal diet, but not with camel milk ; they usually refused palm oil and beans, and could only with difficulty be persuaded to take fresh vegetables unless they were cooked in with meat, but they bought milk when they could.

The incidence of tropical ulcer in these Somali troops was fairly high in 1944 until fresh milk and fresh vegetables became available, when a notable reduction in incidence occurred, but there was an outbreak in one group whose supply of camel milk declined because of drought and poor grazing. A very close correspondence was found between the incidence of ulcer and lack of milk in various bodies of Somali troops about this time, and the author notes that officers of the Somali Scouts have independently formed the opinion that camel milk gives protection against tropical ulcer. He thinks that there is evidence of some protective substance in milk, and possibly in fresh vegetables ; he does not suggest what that substance is. He points out that the army rations provide very much more food than Somali civilians are accustomed to. In the

outbreaks to which he refers, minor foot injuries were no more common during the time of high incidence of ulcer than at any other time.

Charles Wilcocks.

HARE, K. P. **The Comparative Value of some Methods of Treatment in Cases of Tropical Ulcer.** *Indian Med. Gaz.* 1946, Nov., v. 81, No. 11, 449–51.

GRENOILLEAU, G. **An Epidemic of Phagadenic Ulcers in Algeria.** *Bull. Office Internat. d'Hyg. Publique.* 1946, July–Aug.–Sept., v. 37, Nos. 7–8–9, 634–44. [French version 622–33, 1 chart.]

MISCELLANEOUS DISEASES.

HODGES, H. H. & FREEMAN, N. E. **Thrombophlebitis on the Medical Service of a General Hospital.** *Amer. J. Med. Sci.* 1947, Feb., v. 213, No. 2, 226–32. [26 refs.]

The authors report, from the Burma front, 9 American soldiers who developed thrombophlebitis ; 7 of the patients had scrub typhus, 1 acute arthritis, and 1 was suffering from depressive psychosis. The veins of the calf, the femoral veins and the ilio-femoral veins were affected, and the phlebitis was sometimes accompanied by fever, sometimes not ; in 1 patient there had been two pulmonary emboli before the phlebitis was diagnosed. Early symptoms were discomfort and stiffness, pain along the course of the vessel, and, sometimes, signs of obstruction ; but diagnosis may be difficult as signs may be slight and obstruction incomplete. The principal factors in causation seem to be decreased rate of blood flow, perhaps due to the position of the patient in bed ; endothelial injury (which may be present in scrub typhus) ; increased coagulability of the blood ; increased vasomotor tone ; and an unknown factor, presumably toxic, liberated into the circulation as a result of disease or injury.

Treatment was by lumbar paravertebral sympathetic block for phlebitis of the calf veins, which gave good results, presumably by tending to prevent central propagation of the thrombus ; by proximal ligation if the femoral veins were involved ; by the use of heparin when the ilio-femoral veins (which could not be tied) were affected.

[There is no indication that these cases were similar to those reported by MANSON-BAHR & CHARTERS, this *Bulletin*, 1946, v. 43, 1186.]

Charles Wilcocks.

JOSEPH, A. D. **Tropical Eosinophilia.** *Indian Med. Gaz.* 1946, Dec., v. 81, No. 12, 515–20. [20 refs.]

Tropical eosinophilia has been reported quite often from India, and the author adds to the literature by giving a careful account of 16 patients diagnosed at his tuberculosis clinic in the coastal area of Kathiawar. There were 10 males ; the patients were aged 8 to 55 ; caste, season and occupation had little bearing but 4 of the patients gave a history of allergy in their families. The symptoms included severe cough, expiratory dyspnoea like that of asthma (for which the patients sought relief), some fever, loss of weight (cough and dyspnoea excited by the evening meal rendered patients afraid to eat), pain in the chest, sometimes vomiting and diarrhoea, and cutaneous manifestations (in 4 patients—erythema nodosum, urticarial lesions and eruptions like papular tuberculides). The signs included those of pulmonary consolidation, splenomegaly in some,

enlargement of glands in the neck, axilla, groin or abdomen, and pleurisy. The leucocyte count was from 13,500 to 48,000, with eosinophils from 19 to 74 per cent. These cells were also found in the sputum. The erythrocyte sedimentation rate was raised; the histamine test was positive in 2 cases only.

Radiological examination of the chest shows diffuse mottling, usually symmetrical, and most dense round the hila; this is coarser than that of miliary tuberculosis. Diagnosis is not easy, and an X-ray film is needed. Treatment with N.A.B. or other organic arsenicals is very satisfactory.

The author discusses the possible aetiological factors in this disease, mentioning, especially, the virus theory; but he is not in a position to make any decisive judgment on the matter. *Charles Wilcocks.*

Perlingiero, Josephine G. & György, P. **Chronic Eosinophilia. Report of a Case with Necrosis of the Liver, Pulmonary Infiltrations, Anemia and Ascaris Infestation.** *Amer. J. Dis. Children.* 1947, Jan., v. 73, No. 1, 34–43, 4 figs. [Refs. in footnotes.]

Beato Gonzalez, F. Las paralisis por picadura de garrapata en el hombre. [**Tick Paralysis in Man.**] *Med. Colonial.* Madrid. 1947, Mar. 1, v. 9, No. 3, 235–58. [52 refs.]

A historical review.

Paton, J. P. J., Peck, C. R. & van de Schaaf, A. **Report on a Case of Melioidosis from Siam.** *Brit. Med. J.* 1947, Mar. 15, 336–7.

The authors describe a fatal case of melioidosis in a Dutch ex-prisoner of war in Siam. As is usual in these cases diagnosis was not made during life, the clinical features suggesting pneumonia during the early stages and subacute bacterial endocarditis later in the disease. The most prominent symptoms and signs were prolonged fever, breathlessness, pleural effusion, diarrhoea, oedema of the legs and, in the later stages of illness, a generalized petechial rash and septic arthritis of one knee. The patient died after an illness of about 3 months' duration. The course of the disease was not influenced by penicillin or sulphathiazole. The post-mortem findings included pericarditis, multiple abscesses of the small bowel and the kidneys, and congestion and enlargement of the spleen. *Pfeifferella whitmori* was isolated from the abscesses, the spleen and the heart blood.

In a footnote, the observation of one other case in Siam and five cases in Rangoon is recorded. *J. C. Cruickshank.*

Peck, C. R. & Zwanenburg, T. **A Case of Melioidosis presenting as an Abscess in the Neck.** *Brit. Med. J.* 1947, Mar. 15, 337–8.

Pfeifferella whitmori was isolated from the tenacious yellowish-brown pus evacuated from an abscess of 5 weeks' duration in the neck of an Indian soldier stationed in Bangkok, Siam. The abscess, situated just above the supra-sternal notch, was not particularly tender, and there was no fever, glandular enlargement or constitutional disturbance. Healing of the lesion was slow but eventually occurred after an autogenous vaccine had been used for some weeks. The infecting organism was not sensitive to penicillin *in vitro*.

J. C. Cruickshank.

Zotta, G., Radacovici, E., Cantacuzène, A., Lupasco, G. & Teodoresco, A. M. Contribution à l'étude du parasitisme intestinal chez l'homme en Roumanie. [**Intestinal Parasitism in Man in Rumania.**] *Arch. Roumaines Path. Expér. et Microbiol.* 1942, July–Dec., v. 12, Nos. 3/4, 479–83.

Examinations of stools from 5,661 persons at *l'Institut Cantacuzène* during the nine years 1933–1941 showed 2,319 persons to harbour parasites. The actual numbers harbouring the various parasites are set forth in tables ; from these it will be seen that 1,551 had helminth infections, and 1,271 protozoal infections ; some had multiple infestations. Of the helminth infections, *Trichuris trichiura* was found in 745 persons, *Ascaris lumbricoides* in 365, *Diphyllobothrium latum* in 147, and *Taenia saginata* in 140 ; other helminth infestations were recognized in lesser numbers of cases. *Entamoeba coli* accounted for the protozoal parasitization of 903 persons and *Giardia intestinalis* of 308 ; other protozoa were recognized in substantially smaller numbers of cases. [It is very remarkable that neither *Endolimax nana* nor *Entamoeba histolytica* was encountered in a single case.] *A. R. D. Adams.*

Singh, H. **Some Useful Wild Plants of the Delhi Province.** *Indian J. Agric. Sci.* 1945, Dec., v. 15, Pt. 6, 297–308, 17 figs. on 3 pls. & 2 text figs.

Includes many species claimed to have medicinal properties.

GENERAL PROTOZOOLOGY.

Syverton, J. T. & Slavin, H. B. **Human Toxoplasmosis.** *J. Amer. Med. Ass.* 1946, July 20, v. 131, No. 12, 957–9, 2 figs.

The case reported is that of a man 65 years of age who in 1942 was admitted to hospital in Rochester, U.S.A., with a three weeks' history of fever, diarrhoea, crampy discomfort in the abdomen and aching pain in the right elbow. In spite of numerous examinations and tests, the only definite abnormality discoverable was an eosinophilia ranging from 26 to 45 per cent. of the white cells. In view of this, trichinosis was suspected and a biopsy of a portion of gastrocnemius muscle was carried out. In sections of this material, two swollen muscle fibres containing organisms identified as toxoplasma were seen. Accordingly the patient who had been discharged was recalled to hospital and a second biopsy at the old site was performed. Part of the tissue was sectioned but no parasites were seen. The rest of the tissue was ground to an emulsion and used for inoculating 6 mice, 4 guineapigs and 2 rabbits. The kidneys and spleens of these animals were used for passages in which 24 guineapigs, 11 rabbits and 67 mice were used. Parasites were found in only three animals—a guineapig and rabbit of the first passage and a guineapig of the third passage. A serological test carried out by Sabin seven weeks after the onset of illness failed to demonstrate antibodies in the patient's blood. The patient, who had left hospital 20 days after admission, then complained only of weakness. He was seen from time to time during the next 3 years, his blood picture gradually returning to normal.

Of the 35 cases of toxoplasmosis which have been reported to date only three have been in adults. Recovery has occurred in a single instance only—that of a boy who had acute toxoplasmic encephalitis. The present case is of interest in that recovery occurred and in that it is one of the few cases in which a diagnosis by microscopic demonstration of the parasite and animal inoculation has been carried out. *C. M. Wenyon.*

ROBERTSON, E. G. **Toxoplasmic Encephalomyelitis, with the Report of Two Cases.** *Med. J. Australia.* 1946, Sept. 28, v. 2, No. 13, 449–52, 1 fig. [13 refs.]

The two cases described, one in a girl 13 years of age from Tasmania and the other in an infant of 13 months from Melbourne, correspond clinically with cases of toxoplasma infection as described in recent years by SABIN and others in the U.S.A. There seems to be little doubt that infection had occurred *in utero* and that the patients had survived the infection. In the first case the right eye was smaller than the left and showed defects of vision and other abnormalities. There were headaches and periodic epileptiform seizures, and dullness of intellect. In the infant the left eye was smaller than the right and was defective in other respects. In both cases X-ray examination revealed intracerebral foci of calcification. Attempts to confirm the diagnosis by serological tests failed because the serum sent to the U.S.A. proved unsatisfactory. In spite of this the author describes the cases in order to call attention to the existence of the disease in Australia. *C. M. Wenyon.*

ADLER, S., SADOVSKY, A. & BICHOVSKY, L. **Acquired Resistance to Stilbamidine and Pentamidine in** *Trichomonas vaginalis. Harefuah.* Jerusalem. 1947, Feb. 16, v. 32, No. 4. [In Hebrew 54–5. English summary 55.]

GIBBS, A. J. **Observations on** *Leptomonas ctenocephali* **(Fantham, 1912).** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1947, Mar., v. 40, No. 4, 495–500, 8 figs.

GENERAL ENTOMOLOGY.

KERR, R. W. & RAFFERTY, W. J. **A Constant-Pressure Air Valve for the Peet-Grady Atomizer.** Reprinted from *J. Council Scient. & Indust. Res.* 1946, Aug., v. 19, No. 3, 241–4, 2 figs.

" An attachment for the standard Peet-Grady atomizer (De Vilbiss Special No. 5004) which ensures delivery of all the spray liquid at the specified pressure of 12·5 (±0·5) lb. per sq. in. is described. This attachment has the form of a spring-loaded transfer valve, which replaces the cut-off valve in the air line of the standard atomizer, and is operated by a trigger control. When the transfer valve is in the rest position, the compressed air, which operates the atomizer, escapes through a needle valve matched with the atomizer. Depression of the trigger diverts the air steam to the atomizer without alteration in air pressure. This device in no way affects the atomizing characteristics of the atomizer."

BOARD OF TRADE. German Industry. C.I.O.S. XXVI–73. **Insecticides, Insect Repellents, Rodenticides and Fungicides, I. G. Farbenindustrie A.G. Elberfeld and Leverkusen.** 48 mimeographed pp. 1946. London: H.M. Stationery Office. [4*s.*]

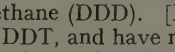
——.——. C.I.O.S. XXIII–20. **Manufacture of Insecticides, Insect Repellents, Rodenticides, I. G. Farbenindustrie A. G., Leverkusen and Elberfeld.** 12 mimeographed pp. 1946. London: H.M. Stationery Office. [1*s.*]

——.——. F.I.A.T. 38. **Investigation of Insecticide and Insectifuge Research and Manufacture in Western Germany.** 30 mimeographed pp. [1947.] London: H.M. Stationery Office. [3*s.*]

German research on insecticides during the war had progressed to a considerable degree in several directions. It seems that the Germans knew of DDT and

were experimenting to try to simplify its manufacture and use. The result was a product called "Lauseto" which contained DDT in a rather crude state but which was easily prepared and emulsified. Attempts were also made to find substances akin to DDT but not covered by the Geigy patent. The most promising substances were "Gix" or "Fluorgesarol" (with fluorine replacing chlorine in the *para* positions on the molecules of DDT), and "Me1700" or dichlor diphenyl dichlorethane (DDD). [Both are of the order of one-third to one-sixth the toxicity of DDT, and have no particular advantage over it.]

A new class of compounds was found to have considerable promise from the insecticidal point of view; this was the sulphones. Some of them are too toxic to mammals to be suitable insecticides but others appear to be quite safe. The most widely used was chlorphenyl chlormethyl sulphone which



was the main toxic agent in "Lauseto Neu". Both this and the "Lauseto" were used to impregnate clothing against body lice. This compound is of the order of toxicity of DDT to some insects but it is handicapped by a very low degree of solubility in mineral oils as well as in water.

In the absence of nicotine, the Germans used a substance they called "Bladan" for agricultural uses; the active principle being the hexa-ethyl ester of tetra-phosphoric acid $((C_2H_5O)_2PO)_3PO$. This compound is unstable on storage and does not compete with nicotine where the natural product is available.

In the field of insect repellents the Germans discovered a very promising compound described as "50/181". This is trichloracetyl chlorethylamide, $CCl_3CO.NH.C_2H_4Cl$, a solid substance which was compounded into the following formula for use :—

7·5	per cent.	"50/181"
1·25	,,	$CaCl_2$
1·25	,,	$MgCl_2$
60	,,	Absolute alcohol.
30	,,	Water

Its possible toxicity to man is not known with any certainty.

J. R. Busvine.

JOHNSON, C. G. **Field Tests on some Pyrethrum Anti-Mosquito Repellent Creams against Woodland Species of Aëdes in Britain.** *J. Trop. Med. & Hyg.* 1947, Feb., v. 50, No. 2, 32–6.

Using a standard technique, the author has compared the properties of three types of repellents against British *Aëdes* species, chiefly *A. punctor*, *A. cantans* and *A. annulipes*. The results are expressed in terms of a standardized biting rate, or SBR, in which 0 indicates complete protection as compared with controls, 100 no protection, and 60 a 40 per cent. reduction in bites.

The one-time standard Army citronella cream, containing 28 per cent. of citronella oil in hard and soft paraffins, gave no protection after more than two hours and was in any case so disliked as to be useless. A paraffin cream containing 1 per cent. pyrethrins gave poor protection, the SBR varying between 64 and 108 per cent. A similar strength of pyrethrins in gum tragacanth emulsion gave good protection for at least 7½ hours, the SBR varying from 16 to 29 except for one reading of 52 at 4½ to 5 hours. A repetition of the experiment with similar preparations or slight variations of them convinced the author that this decreased repellency at about 4 hours, followed by recovery, was a real phenomenon, perhaps associated with the action of water on pyrethrins.

G. Macdonald.

VAN SOMEREN, E. C. C. **The Description of a New Anopheles of the Myzorhynchus Series from Madagascar with Notes on its Systematic Position in relation to the Ethiopian Species of this Group.** *East African Med. J.* 1947, Jan., v. 24, No. 1, 42–6, 2 figs.

MCMAHON, J. P. **Simuliidae of Kenya.** *East African Med. J.* 1947, Jan., v. 24, No. 1, 51–6.

A general account of the subject.

IRIARTE, D. R. La familia Simuliidae en Venezuela. [**The *Simulidae* of Venezuela.**] *Bol. Laboratorio Clinica "Luis Razetti".* 1946, June, v. 14, Nos. 19/20, 333–47 & Dec., v. 15, Nos. 21/22, 401–82, 17 figs., 5 pls. & 2 maps. [Bibliography.] English summary.

SNODGRASS, R. E. **The Skeletal Anatomy of Fleas (Siphonaptera).** *Smithsonian Miscellaneous Collections.* 1946, Apr. 1, v. 104, No. 18, (Publication 3815), 89 pp., 8 figs. & 21 pls. [39 refs.]

MÅNUWA, S. L. A. **Porocephalosis.** [Correspondence.] *Trans. Roy. Soc. Trop. Med. & Hyg.* 1947, Mar., v. 40, No. 4, 507–8.

The author refers to STOCK's note [this *Bulletin*, 1947, v. 44, 136] regarding *Armillifer* infestation of the lung, and records that he has seen 5 cases in 19 years in Southern Nigeria. Two were seen in an inguinal hernial sac at operation, and two were only diagnosed at autopsy. The fifth took the form of a calcified nodule on the pelvic wall, and had attached to it a fibrous band which extended to the root of the mesentery, and which had kinked and strangulated a coil of the lower ileum. The patient suffered from acute obstruction, promptly relieved by division of the band. The nodule was identified as a calcified nymph of *A. armillatus*.

All five cases were found in members of tribes given to eating snakes or of using them for *juju*.

The author analyses the evidence and his own observations, which he summarizes thus :—

1. Infestation is usually symptomless, unless heavy parasitization of a vital organ occurs. (CANNON's case [this *Bulletin*, 1943, v. 40, 415] is quoted, in which a heavy infestation of the colon produced a fatal obstruction.)

2. If the nymphs rupture their cysts, escape and migrate, serious pathological lesions may occur ; in one of the author's cases, nymphs were found in radicles of the hepatic vein and the symptoms suggested acute poisoning.

3. Calcareous and degenerative reactions around the nymphs may produce mechanical disturbances ; but there is no evidence that the parasites produce toxins. — *H. J. O'D. Burke-Gaffney.*

LABORATORY PROCEDURES.

CHATTERJEE, H. N. **A New Method of demonstrating Malarial Parasites in the Peripheral Blood.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1947, Mar., v. 40, No. 4, 501–3. [11 refs.]

The author describes a supravital technique, in which fat-free slides are prepared with a film of 2 parts of Leishman stain and 1 part of brilliant cresyl blue (1 per cent. alcoholic solution). The stain is dried quickly, without direct heat, and the blood is taken from a finger on a fresh fat-free, alcohol-cleaned

coverslip, which is placed immediately on the stained slide. The preparation is examined after 10 minutes standing at room temperature, but not later than 24 hours after it has been made.

The chromatin of the parasite stains chocolate red, the cytoplasm deep blue and the corpuscle light green. This contrast makes it possible to pick out parasites very readily; there is little distortion of red cells and reticulocytes are also stained.

The author claims that this technique combines all the advantages, and none of the drawbacks of a thick smear; and that as fixing, dehaemoglobination, drying, washing and other time-consuming processes are eliminated, it is as quick as most methods now in use. Prepared slides may be carried in boxes for field mass-examination, so that all that is required further is to touch a drop of blood on the coverslip, place it on the slide and examine after 10 minutes.

H. J. O'D. Burke-Gaffney.

JOANNIDES, G. **A Simple Method of Staining Malaria Parasites.** *J. Lab. & Clin. Med.*, 1947, Jan., v. 32, No. 1, 89.

This represents yet another simple stain for malaria parasites, developed during the wartime shortage of the common stains and reagents. It is a combination and modification of many other methods, and its efficacy is believed to be due to (1) the almost complete transformation of methylene blue to azure (2) the relatively greater alcohol-solubility of the latter (3) the insolubility of borax in alcohol.

Methylene blue (0·5 gm.) and borax (1·5 gm.) are placed in a 50 cc. porcelain dish, to which is added, with stirring, 30 cc. of boiling tap water.

This liquid is evaporated to dryness in about half an hour over a flame adjusted to maintain a temperature of 75° to 80°C.

The processes of adding 30 cc. of boiling tap water and of evaporation are repeated a second and a third time.

At the end of 24 hours standing, a dry blue compact mass is left in the dish. To this, without stirring, 30 cc. of 95 per cent. alcohol are added, after which the alcohol is decanted five minutes later into a 100 cc. bottle and the residue in the dish is allowed to dry almost completely. This extraction is repeated a second and third time, with 30 cc. and 40 cc. of alcohol respectively. The bottle now contains about 100 cc. of blue alcoholic extract, without a precipitate.

For staining, 15 drops of the alcoholic stain are placed on an unfixed blood film. At the end of 30 to 60 seconds, 15 drops of a 1 to 2,000 solution of eosin in tap water are added. The stains are mixed with a glass rod. After 3 to 4 minutes, the slide is flooded with tap water, washed with it and dried. The following staining appearances are seen:

Red cells—light green, with a pinkish cast.
Eosinophiles—pink granules.
Other leucocytes—as in Giemsa's stain.
Malaria parasites—as in Giemsa's stain, but stained rather less deeply.

H. J. O'D. Burke-Gaffney.

MANISCALCO, G. Per la colorazione del parassita malarico. [**To Stain Malarial Parasites.**] *Riv. di Malariologia.* 1942, Nov.–Dec., v. 21, No. 6, 456–7.

The following method is advocated for the staining of blood films for demonstration of malarial and other parasites. To a solution of 5 gm. of medicinal methylene blue in 250 cc. distilled water, are added 25 cc. of pure ammonia solution. The mixture is steamed on a water bath till evaporation has taken place. After cooling, the residue is pulverized in a mortar. Five solutions are

prepared :—(1) Of the above powder 0·25 gm. is dissolved in 25 cc. distilled water. (2) Medicinal methylene blue 0·15 gm. in 25 cc. distilled water. (3) Eosin 0·25 gm. in 25 cc. distilled water. (4) Resorcin 0·25 gm. in 25 cc. distilled water. (5) Disodium phosphate 20 gm. in 1,000 cc. of tap water to which 50 drops of glacial acetic acid have been added. The immediate staining solution is prepared by diluting 5 cc. of solution 5 with 35 cc. tap water and adding 4 drops of each of the other solutions. This quantity of stain, which retains its properties for 24 hours, is sufficient for a Choplin dish holding a number of slides. Thin films are first fixed in methyl alcohol, but thick films are stained directly. After half an hour's staining the slides are washed in tap water. The staining is said to resemble that given by the May-Grünwald-Giemsa method.

C. M. Wenyon.

Simons, H. C. R. Kritische Beiträge zur parasitologischen Feindiagnostik von Blutparasiten unter Berücksichtigung der neuen Thedanblau-Methoden. Postvital gefärbte Nativpräparate von Trypanosomen, Spirochäten und Plasmodien, insbesondere Halbmonden. Native Leuchtbilder von Spirochäten. Fehlerquellen durch Pseudospirochäten. [**New "Thedanblau" Stain for Blood Parasites and Blood Corpuscles.**] *Schweiz. med. Woch.* 1946, Sept. 28, v. 76, No. 39, 992–4. [Numerous refs.]

For some years the author, in collaboration with Theda Stückgold-Kornelius who died in 1945, has studied the combined action of saponin and methylene blue on blood parasites and blood corpuscles. A stable mixture of these two substances has been devised, and named "Thedanblau", in honour of the deceased collaborator. The mixture, which is stable even under tropical conditions, is haemolytic by virtue of the saponin, and a staining reagent by virtue of the methylene blue. Its two-fold action is almost instantaneous. The staining is selective for all blood parasites, leucocytes and reticulocytes. It may be employed by mixing blood and stain together for wet preparations to be examined by transmitted light or dark ground illumination, or it may be employed on ordinary dry films. It is particularly useful when parasites are very scanty in the blood, cerebrospinal fluid or lymph gland material. For the identification of trypanosomes and spirochaetes it is useful, as these organisms assume a characteristic red colour and with the haemolysis of the red corpuscles are very conspicuous. For malarial parasites the crescents are most clearly shown, though other pigmented stages, including schizonts with their merozoites, can be identified. The non-pigmented stages are liable to confusion with reticulocytes. The use of Thedanblau is recommended for field work when intensive surveys are being made. The paper gives a mass of detail of the various methods of using the stain, which is undoubtedly a useful addition to microbiological technique.

The exact composition of the stain is not given; manufacturer: Negociateur A. G., Münchenstein b. Basel.

C. M. Wenyon.

Pará, M. **Silver Impregnation of Spirochetes in Tissue Sections. Description of a New Technic.** *Arch. Pathology.* 1946, Dec., v. 42, No. 6, 649–55. [Summary appears also in *Bulletin of Hygiene.*]

The author describes at length and in great detail a method which he has devised for silver impregnation of spirochaetes in tissue sections.

The details do not lend themselves to abstraction and the original paper should be consulted in this connexion.

The fundamental principle of the method is the use of a lithium-silver complex in a colloidal medium to obtain selective impregnation.

A " basic " and a " rapid " method are described : in the latter, a double process of impregnation and reduction avoids the use of a mordant, and the process may be completed in two hours.

The fundamental reagents required in the basic method are uranium nitrate, silver nitrate, lithium carbonate, rosin and Levaditi's reducing solution.

Satisfactory substitutes for the reagents used in the mordant, the sensitizer and the reducing agent are described : the author particularly emphasizes the possibility of using ox-bile as a substitute either for the rosin or the lithium-silver complex : not only does it serve this dual capacity, but it is easy to obtain.

A " combined " process and other variations in the technique indicate its wide range and applicability. The method should prove a useful and accurate one for the rapid demonstration of spirochaetes in paraffin sections.

H. J. O'D. Burke-Gaffney.

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS.

SERGIJEV, P. G. [**Report on the Activities of the Institute of Malaria, Medical Parasitology and Helminthology of the Academy of Medical Sciences during the last 25 Years.**] *Med. Parasit. & Parasitic Dis.* Moscow, 1946, v. 15, No. 1, 3–18 ; No. 2, 3–20. [In Russian.]

In this article, the Director of the Institute, which is a branch of the Academy of Medical Sciences of U.S.S.R., gives an historical survey of its organization and activities during the 25 years since it was founded as the Tropical Institute.

The main objects of the Institute are (1) practical assistance to the Commissariat (now Ministry) of Health in the organization of measures for combating malaria and other parasitic diseases ; (2) training of specialists for the staffs of malaria units ; and (3) research work in medical parasitology.

The Institute has devised antimalarial measures applicable to conditions in different parts of the Soviet Union, which were studied locally by members of its staff from Moscow. The Institute was also responsible for the creation and direction of most of the tropical institutes in the federated republics. It also organized numerous expeditions throughout the Union, with the object of making epidemiological surveys of parasitic diseases and of testing the application of control methods elaborated at the Institute.

Instructions for medical practitioners and other literature dealing with prophylactic and therapeutic treatment of parasitic diseases in U.S.S.R. have been issued by the Institute.

The teaching work comprises postgraduate training of specialists in malaria and general medical parasitology and the provision of laboratory facilities for practical training in research work. Most of the workers in medical parasitology scattered throughout the country have received their training at the Moscow Institute.

The review deals largely with the results achieved by research workers attached to the institute. Most of the relevant papers have appeared in *Medical Parasitology and Parasitic Diseases* (formerly *Russian Journal of Tropical Medicine*), published by the Institute.

Much of the work carried out at the Institute has been devoted to various aspects of malaria : its parasitology, pathology and clinical course, drug treatment and prophylaxis, vectors and mosquito control, as well as epidemiology. Notable advances have been made in the study and control of helminthic diseases, diseases transmitted by sandflies (leishmaniasis and sandfly fever), protozoal infections, rickettsial and virus diseases, tick-borne diseases (relapsing

fever, seasonal encephalitis and typhus fever) and in the bionomics of insect vectors. Investigations have also been conducted on leprosy, mycoses and on chemotherapy, the special aim of the latter being the discovery of new synthetic drugs. The study of antibiotics has also received attention. Many of the papers describing this work have already been reviewed in this *Bulletin* during the period covered by this report. *C. A. Hoare.*

VAN LOGHEM, J. J. **Health Conditions in the Netherlands East Indies during the Japanese Occupation.** *Bull. Office Internat. d'Hyg. Publique.* 1946, July–Aug.–Sept., v. 37, Nos. 7–8–9, 513–19. [French version 506–12.]

SIMMONS, J. S. **Tropical Medicine and the Challenge of Global War.** *Amer. J. Trop. Med.* 1947, Jan., v. 27, No. 1, 1–9, 2 charts.

SIMMONS, J. S. **Tropical Medicine and the Challenge of Global Peace.** *Amer. J. Trop. Med.* 1947, Jan., v. 27, No. 1, 11–19.

BOOK REVIEW.

COVA-GARCIA, Pablo. **Notas sobre los Anofelinos de Venezuela y su Identificación.** [Notes on the Anophelines of Venezuela and their Identification.] *XII Conferencia Sanitaria Panamericana. Cuadernos Amarillos No. 1.* 208 pp., 42 figs. & 53 pls. [Bibliography.] 1946. Caracas: Editorial Grafolit.

This book is a manual, in Spanish, for the identification of the species of *Anopheles*, about 30 in all, which occur in Venezuela. It deals in detail with external anatomy of larva and adult, and sets the information out (not without repetition) in figures, keys, the text, and so forth. Eggs and pupae are dealt with more generally, probably because many of the specific characters are not yet known. We observe an interesting series of figures, which indicate that there is much variety in the structure of the egg in certain species. This anatomical part of the book is full, and so far as we can judge, thorough.

The author then gives brief notes on Megarhinini and Culicini and passes to his second more general section. This deals with the historical development of knowledge of *Anopheles* in his country, the place of *Anopheles* in the Animal Kingdom and other general topics.

The book concludes with notes on field and laboratory methods of study.

The author confines himself to Anopheles as a dead specimen. He gives brief general notes on biology, but nothing on biological differences between species; there is nothing on the relation of species to malaria, or on control.

P. A. Buxton.

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ALPHABETICAL LIST OF AUTHORS OR SOURCES.

Adolph, E. F., 619.
Attiah, M. A. H., 614.
——, Salem, H. H. & El-Gammal, Y., 618.
Audy, J. R., 577.

Balamuth, W. & Howard, B., 582.
Basnuevo, J. G. & Sotolongo, F., 585.
Bazemore, J. M., Johnson, H. H., Swanson, E. R. & Hayman, J. M., Jr., 559.
Beato Gonzalez, F., 622.
Becker, E. R., Burks, C. & Kaleita, E., 583.
Bernkopf, H., Olitzki, L. & Stuczynski, L. A., 587.
Board of Trade, 624 *ter*.
Boiron, H., 586.
Bond, V. P., Bostick, W., Hansen, E. L. & Anderson, H. H., 585.
Bonne, C., 584.
de Borchgrave, O., 570.
Bourgain, M., 587.
Boyd, M. F. & Kitchen, S. F., 560.
British Med. J., 616.

Caplan, A. & Lindsay, J. K., 618.
Carbonell, M. & Contreras Dueñas, 592.
Cartwright, G. E. & Wintrobe, M. M., 608.
Ceithaml, J. & Evans, E. A., Jr., 567.
Chala, J. I., 597.
Charters, A. D., 620.
Chatterjee, H. N., 626.
Ciuca, M., Ballif, L. & Chelarescu, M., 561.
——, ——, —— & Cristescu, A., 559.
Clapp, J. M., Fay, R. W. & Simmons, S. W., 563.
Clark, W. B., 603.
Cole, G., 602.
da Costa, E., 558.
Cova-Garcia, P., 630.

Darby, W. J., Kaser, M. M. & Jones, E., 608.
Dearborn, E. H. & Marshall, E. K., Jr., 568.
Denhoff, E., 598.
Do Prado, F. C. & Figliolini, F., 583.
Dorrance, G. M. & Bransfield J. W., 602.

El Kordy, M. I., 601.

Faget, G. H., 588, 593.
——, Pogge, R. C., Johansen, F. A., Fite, G. L., Prejean, B. M. & Gemar, F., 594.
Falcone, G. 568.
Fay, R. W., Simmons, S. W. & Clapp, J. M., 562.
Federico Guillot, C. & Osvaldo Curci, A. 591.
Fernandez, J. M. M. & Carboni, E. A., 595.
Findlay, G. M., 579.
Floch, H. & de Lajudie, P., 589.
da Fonseca, O., Jr., 610.

Garcin, G., 617.
Gellhorn, A., Rose, H. M. & Culbertson, J. T., 602.
Gendel, B. R., 609.
Graves, P. R., 605.
Gurevitch, J. & Delightish, J., 581.

Hallberg, V., 591.
Hampton, S. F., 573.
Harris, A. H. & Down, H. A., 581.
Henderson, A. B. & Thornell, H. E., 609.
Henderson-Begg, A. & Fulton, F., 577.
Hibbs, R. E., 607.
Hodges, H. H. & Freeman, N. E., 621.
Hodgson, C. H., 578.
Hovanitz, W., 566.

Ibarra Perez, R. & Gonzalez Prendes, M. A., 588.
Ibrahim, K. G., 618.
Ikejiani, O., 572 *quat*.
Iyengar, M. O. T., 564.

Joannides, G., 627.
Johnson, C. G., 625.
Joseph, A. D., 621.

Kalra, S. L., 575.
Kennedy, J. S., 561.
Kerr, R. W. & Rafferty, W. J., 624.
Koprowski, H., 580.
Kotby, A., 614.
Kuhn, H. S., 617.

Laha, P. N., 585.
Laigret, J., 580.
Languillon, J., 596.
Lippincott, S. W., Paddock, F. K., Rhees, M. C., Hesselbrock, W. B. & Ellerbrook, L. D., 601.
Liu, W. T., 574.
Ludwig, R. G. & Nicholson, H. P., 574.
Lurye, A., 558.

McDonald, S., 592.
Machella, T. E., with Fine, R. & Burgoon, D. F., 557.
Mackerras, I. M. & Aberdeen, J. E. C., 555.
McMahon, J. P., 626.
Maniscalco, G., 627.
Manuwa, S. L. A., 626.
Markell, E. K., Mullinger, P. E. & Schneider, D. J., 597.
Mider, G. B., Smith, F. D. & Bray, W. E., Jr., 610.
Mirvish, I. & Hilson, D., 615.
Mom, A. M., 594.
—— & Bernal, M., 596.
Mukerji, A. K., Bhaduri, N. V. & Narain, S., 599.
Muniz, J. & de Freitas, G., 571.

Neves, J. A. & Costa, O. G., 610.

Oteiza Setien, A., Ibarra Perez, R. & Gonzalez Prendes, M. A., 589.

Pará, M., 628.
Paton, J. P. J., Peck, C. R. & van de Schaaf, A., 622.
Peck, C. R. & Zwanenburg, T., 622.
Phillips, H. A., 606.
Pick, F., 582.
Pogge, R. C. & Ross, H., 593.
Pollard, M., Wilson, D. J., Livesay, H. R. & Woodland, J. C., 574.

Rai, B. B., 559.
Raskan, S. B., 606.
Reddy, D. G. & Rangam, C. M., 583.
Reed, H., 615.
Reed, J. G., 614.
Robertson, E. G., 624.
Roca Garcia, M. & Bates, M., 580.
Rostorfer, H. H. & McGee, H. R., 567.

Sabrosky, C. W., 556.
Saglam, T., 610.
Seaton, D. R. & Stoker, M. G. P., 576.
Sergijev, P. G., 629.
Shapland, C. D., 611.
Shepard, C. C. & Topping, N. H., 573.
Shookhoff, H. B., Birnkrant, W. B. & Greenberg, M., 603.
Simons, H. C. R., 628.
Simpson, T., 588.
Singh, H., 623.
Smith, D. A., 604.
Snyder, T. L. & Meleney H. E., 582.
Sorsby, A. & Ungar, J., 616.
Soubigou, X., Autheman & Guennec, 585.
Spies, T. D., 609.
Stephens, P. A. & Pratt, H. D., 564.
Stephenson, R. W., 598.
Suárez, R. M., Welch, A. D., Heinle, R. W., Suárez, R. M., Jr. & Nelson, E. M., 607.
Syverton, J. T. & Slavin, H. B., 623.

Tarzwell, C. M. & Fisk, F. W., 563.
van Thiel, P. H. & Weurman, C., 557.
Thompson, P. E., 569.
Thorne, B. T., 615.
Tillman, A. J. B., 600.
Tisseuil, J., 618.

Ungureanu, E., 557.

Wahl, P. N., 558.
Weil, A. & Haymaker, W., 577.
Weller, T. H., 599.
Westphal, E. A. & Horton, R. K., 565.
Williams, F. E., 599.
Winkle, S., 573, 574.
Wolfson, F., 568.
—— & Cakrtova, M., 566.
—— & Winter, M. W., 565.

Zotta, G., Radacovici, E., Cantacuzène, A., Lupasco, G. & Teodoresco, A. M., 623.

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